**1.4 µm continuous-wave diamond Raman laser**

The longest wavelength (~1.4 µm) emitted by a diamond Raman laser pumped by a semiconductor disk laser (SDL) is reported. The output power of the intracavity-pumped Raman laser reached a maximum of 2.3 W with an optical conversion efficiency of 3.4% with respect to the absorbed diode pump power. Narrow Stokes emission (FWHM <0.1 nm) was attained using etalons to limit the fundamental spectrum to a single etalon peak. Tuning of the Raman laser over >40 nm was achieved via rotation of an intracavity birefringent filter that tuned the SDL oscillation wavelength.

**General information**

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Authors: Casula, R., Penttinen, J., Kemp, A. J., Guina, M., Hastie, J. E.
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Scopus rating (2012): SJR 2.587 SNIP 2.145 CiteScore 3.85
Scopus rating (2011): SJR 2.579 SNIP 2.606 CiteScore 4.04
Scopus rating (2010): SJR 2.943 SNIP 2.466
Scopus rating (2009): SJR 3.092 SNIP 2.669
Scopus rating (2008): SJR 3.195 SNIP 2.393
Scopus rating (2007): SJR 3.27 SNIP 2.032
Scopus rating (2006): SJR 3.233 SNIP 2.326
Scopus rating (2005): SJR 3.334 SNIP 2.379
Scopus rating (2004): SJR 2.833 SNIP 2.499
Scopus rating (2003): SJR 2.688 SNIP 2.193
Scopus rating (2002): SJR 1.547 SNIP 1.673
Scopus rating (2001): SJR 1.442 SNIP 1.39
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Research output: Scientific - peer-review › Article

**Development of Advanced Fe–Cr Alloys for Demanding Applications Utilizing Synchrotron Light Mediated Electron Spectroscopy**

High-temperature corrosion resistance of ferritic stainless steels (Fe–Cr based alloys) is built upon the formation of protective Cr-rich oxide scale. However, Cr vaporization limits the use of Fe–Cr alloys under extreme service conditions; in particular, it has been identified as the most significant failure mechanism in solid-oxide fuel cells (SOFCs). Our study focuses on the initial stages of oxide scale formation on ferritic stainless steels and shows that the Cr vaporization can be controlled via the alloy composition and heat treatments.

In this work, we investigate the influence of heat treatment on the initial stages of oxidation of two Ti–Nb stabilized ferritic...
stainless steels (EN 1.45091,2 and EN 1.45213,4) at 650 °C by synchrotron light mediated X-ray photoelectron spectroscopy (XPS) and photoemission electron microscopy (PEEM). The high degree of alloying makes these alloys suitable for high temperature applications, but also renders the alloys prone to microstructural changes that can affect the growth of protective oxide scale. As a demonstration of this, we show that the heat treatment induced precipitation of (FeCrSi)2(MoNb)-type Laves phase results in less pronounced surface segregation and oxidation of minor alloying elements (Mo, Mn, Nb, Ti, Si). Most significantly, the diffusion of Mn and the formation of low volatile (MnCr)3O4 spinel oxide at the surface above Cr2O3 are strongly suppressed.

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Research output: Scientific › Paper, poster or abstract

High-Power 1180-nm GaInNAs DBR Laser Diodes
We report high-power 1180-nm GaInNAs distributed Bragg reflector laser diodes with and without a tapered amplifying section. The untapered and tapered components reached room temperature output powers of 655 mW and 4.04 W, respectively. The diodes exhibited narrow linewidth emission with side-mode suppression ratios in the range of 50 dB for a broad range of operating current, extending up to 2 A for the untapered component and 10 A for the tapered component. The high output power is rendered possible by the use of a high quality GaInNAs-based quantum well gain region, which allows for lower strain and better carrier confinement compared with traditional GaInAs quantum wells. The development opens new opportunities for the power scaling of frequency-doubled lasers with emission at yellow–orange wavelengths.

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Ministry of Education publication type: A1 Journal article-refereed
Organisations: Photonics, Research group: ORC, Research group: Surface Science, Okmetic Oyj, Norlase ApS, Denmark Technical University DTU
Authors: Aho, A. T., Viheriälä, J., Korpijärvi, V., Koskinen, M., Virtanen, H., Christensen, M., Uusitalo, T., Lahtonen, K., Valden, M., Guina, M.
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Scopus rating (2014): SJR 1.461 SNIP 1.614 CiteScore 2.78
Scopus rating (2013): SJR 1.487 SNIP 1.547 CiteScore 2.95
Scopus rating (2012): SJR 1.623 SNIP 1.706 CiteScore 2.46
Scopus rating (2011): SJR 1.51 SNIP 2.012 CiteScore 2.48
Scopus rating (2010): SJR 1.474 SNIP 1.623
Scopus rating (2009): SJR 1.775 SNIP 1.804
Scopus rating (2008): SJR 2.081 SNIP 1.818
Scopus rating (2007): SJR 2.345 SNIP 1.566
Scopus rating (2006): SJR 2.112 SNIP 1.884
Scopus rating (2005): SJR 2.97 SNIP 2.454
Scopus rating (2004): SJR 3.286 SNIP 2.716
Scopus rating (2003): SJR 3.44 SNIP 2.467
Scopus rating (2002): SJR 3.566 SNIP 2.117
Path integral Monte Carlo benchmarks for two-dimensional quantum dots

We report numerically accurate path integral Monte Carlo results for harmonically confined two-dimensional quantum dots containing up to N=60 interacting electrons. The finite-temperature values are extrapolated to 0 K and zero time step in order to provide precise upper-bound energies. The ground-state energies are compared against coupled-cluster and diffusion Monte Carlo results available in the literature for N≤20. We also provide Padé fits for the energies as a function of N for different strengths of the confining potential. The fits deviate less than 0.25% from the path integral Monte Carlo data. Overall, our upper-bound estimates for the ground-state energies have lower values than previous diffusion Monte Carlo benchmarks due to the accurate nodal surface in our simulations. Hence, our results set a new numerical benchmark for two-dimensional (spin-unpolarized) quantum dots up to a large number of electrons.

General information

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Organisations: Physics, Research group: Quantum Control and Dynamics, Research area: Computational Physics, Oak Ridge National Laboratory
Authors: Kylänpää, I., Räsänen, E.
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Scopus rating (2015): SJR 1.943 SNIP 1.008 CiteScore 2.8
Scopus rating (2014): SJR 2.656 SNIP 1.302 CiteScore 3.3
Scopus rating (2013): SJR 2.804 SNIP 1.348 CiteScore 3.55
Scopus rating (2012): SJR 3.159 SNIP 1.397 CiteScore 3.57
Scopus rating (2011): SJR 3.306 SNIP 1.433 CiteScore 3.61
Scopus rating (2010): SJR 3.303 SNIP 1.45
Scopus rating (2009): SJR 3.116 SNIP 1.467
Scopus rating (2008): SJR 2.949 SNIP 1.525
Scopus rating (2007): SJR 2.925 SNIP 1.609
Scopus rating (2006): SJR 2.799 SNIP 1.56
Scopus rating (2005): SJR 2.748 SNIP 1.587
Scopus rating (2004): SJR 2.718 SNIP 1.583
Scopus rating (2003): SJR 2.71 SNIP 1.512
Scopus rating (2002): SJR 2.782 SNIP 1.704
Scopus rating (2001): SJR 2.968 SNIP 1.648
Scopus rating (2000): SJR 2.979 SNIP 1.629
In this work, we propose new field-free estimators of static field-gradient polarizabilities for finite temperature path-integral Monte Carlo method. Namely, dipole–quadrupole polarizability A, dipole–dipole–quadrupole polarizability B, and quadrupole–quadrupole polarizability C are computed for several up to two-electron systems: H, H^- , He, Li^+ , Be^{2+} , Ps_2 , PsH, H_2^+ , H_2 , H_3^+ , and HeH^+. We provide complementary data for ground state electronic properties within the adiabatic approximation and demonstrate good agreement with available values in the literature. More importantly, we present fully non-adiabatic results from 50 K to 1600 K, which allow us to analyze and discuss strong thermal coupling and rovibrational effects in total field-gradient polarizabilities. These phenomena are most relevant but clearly overlooked, e.g., in the construction of modern polarizable force field models. However, our main purpose is demonstrating the accuracy and simplicity of our approach in a problem that is generally challenging.
Atomistic model for nearly quantitative simulations of Langmuir monolayers

Lung surfactant and a tear film lipid layer are examples of biologically relevant macromolecular structures found at the air–water interface. Because of their complexity, they are often studied in terms of simplified lipid layers, the simplest example being a Langmuir monolayer. Given the profound biological significance of these lipid assemblies, there is a need to understand their structure and dynamics on the nanoscale, yet there are not many techniques able to provide this information. Atomistic molecular dynamics simulations would be a tool fit for this purpose; however, the simulation models suggested until now have been qualitative instead of quantitative. This limitation has mainly stemmed from the challenge to correctly describe the surface tension of water with simulation parameters compatible with other biomolecules. In this work, we show that this limitation can be overcome by using the recently introduced four-point OPC water model, whose surface tension for water is demonstrated to be quantitatively consistent with experimental data and which is also shown to be compatible with the commonly employed lipid models. We further establish that the approach of combining the OPC four-point water model with the CHARMM36 lipid force field provides nearly quantitative agreement with experiments for the surface pressure–area isotherm for POPC and DPPC monolayers, also including the experimentally observed phase coexistence in a DPPC monolayer. The simulation models reported in this work pave the way for nearly quantitative atomistic studies of lipid-rich biological structures at air–water interfaces.
Decreasing Defect-State Density of Al₂O₃/GaₓIn₁−ₓAs Device Interfaces with InOₓ Structures

Control of defect densities at insulator/GaₓIn₁−ₓAs interfaces is essential for optimal operation of various devices like transistors and infrared detectors to suppress, for example, nonradiative recombination, Fermi-level pinning, and leakage currents. It is reported that a thin InOₓ interface layer is useful to limit the formation of these defects by showing effect of InOₓ on quantum efficiency of Ga₀.₄₅In₀.₅₅As detector and on photoluminescence of GaAs. A study of the Al₂O₃/GaAs interface via hard X-ray synchrotron photoelectron spectroscopy reveals chemical structure changes at the interface induced by this beneficial InOₓ incorporation: the InOₓ sheet acts as an O diffusion barrier that prevents oxidation of GaAs and concomitant As bond rupture.

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ASJC Scopus subject areas: Physics and Astronomy(all)
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Research output: Scientific › Article

Tuning Localized Surface Plasmon Resonances by Self-Assembly in Multi-Metal Nanostructures
Block copolymers together with conventional nanolithography offer an intriguing possibility to realize complex photonic nanostructures that would otherwise be impossible or extremely difficult to manufacture. Sub-wavelength nanostructures made of noble metals exhibit localized surface plasmon resonances that can be tailored by tuning the geometry of the structures. We demonstrate that combining plasmonic nanoarrays with block copolymer self-assembly allows realization of multi-metal structures that display altered optical behavior.

A high speed electron-beam lithography technique (Dots-On-The-Fly) was used to fabricate arrays of thin, plasmonic gold structures, which then acted as a directing template for the self-assembly of asymmetric poly(styrene-b-2-vinyl pyridine) (PS-P2VP). Solvothermal annealing resulted in the PS-P2VP assembling in the gap regions of the plasmonic structures. The P2VP domains could then be converted into a variety of metals such as Au, Ag or Pt to populate the gap with plasmonic nanoparticles. 3D and 2D computational modeling was used to estimate the effects of geometry and material combinations on the far field spectrum and the local field-enhancement in the gap. Self-assembled multimaterial plasmonic devices have various applications in near field sensing, nonlinear optical interactions and photocatalysis.

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State: Published
Organisations: Photonics, Research group: Nanophotonics
Authors: Hulkkonen, H., Salminen, T., Rasappa, S., Niemi, T.
Publication date: 17 Sep 2017
Peer-reviewed: Unknown
Research output: Scientific › Paper, poster or abstract
Optically pumped VECSELs: review of technology and progress

Vertical-external-cavity surface-emitting lasers (VECSELs) are the most versatile laser sources, combining unique features such as wide spectral coverage, ultrashort pulse operation, low noise properties, high output power, high brightness and compact form-factor. This paper reviews the recent technological developments of VECSELs in connection with the new milestones that continue to pave the way towards their use in numerous applications. Significant attention is devoted to the fabrication of VECSEL gain mirrors in challenging wavelength regions, especially at the yellow and red wavelengths. The reviewed fabrication approaches address wafer-bonded VECSEL structures as well as the use of hybrid mirror structures. Moreover, a comprehensive summary of VECSEL characterization methods is presented; the discussion covers different stages of VECSEL development and different operation regimes, pointing out specific characterization techniques for each of them. Finally, several emerging applications are discussed, with emphasis on the unique application objectives that VECSELs render possible, for example in atom and molecular physics, dermatology and spectroscopy.

General information
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Ministry of Education publication type: A2 Review article in a scientific journal
Organisations: Photonics, Research group: ORC
Authors: Guina, M., Rantamäki, A., Härkönen, A.
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Scopus rating (2015): SJR 0.693 SNIP 1.046 CiteScore 2.1
Scopus rating (2014): SJR 1.069 SNIP 1.383 CiteScore 2.53
Scopus rating (2013): SJR 1.18 SNIP 1.469 CiteScore 2.6
Scopus rating (2012): SJR 1.244 SNIP 1.394 CiteScore 2.31
Scopus rating (2011): SJR 1.257 SNIP 1.399 CiteScore 2.36
Scopus rating (2010): SJR 1.291 SNIP 1.288
Scopus rating (2009): SJR 1.283 SNIP 1.337
Scopus rating (2008): SJR 1.446 SNIP 1.563
Scopus rating (2007): SJR 1.385 SNIP 1.633
Scopus rating (2005): SJR 1.203 SNIP 1.466
Scopus rating (2004): SJR 1.123 SNIP 1.442
Scopus rating (2003): SJR 0.9 SNIP 1.2
Scopus rating (2002): SJR 0.99 SNIP 1.221
Scopus rating (2001): SJR 0.901 SNIP 1.205
Scopus rating (2000): SJR 0.79 SNIP 1.133
Scopus rating (1999): SJR 0.925 SNIP 1.249
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http://urn.fi/URN:NBN:fi:tty-201709251960
Research output: Scientific - peer-review › Review Article

Tunable narrow-linewidth VECSELs for atomic and molecular physics

General information
State: Published
Organisations: Photonics, National Institute of Standards and Technology, Time and Frequency Division, Boulder, Colorado
VECSEL: a versatile laser tool for ion trappers

General information
State: Published
Organisations: Photonics, National Institute of Standards and Technology, Time and Frequency Division, Boulder, Colorado
Authors: Penttinen, J., Leinonen, T., Burd, S. C., Allcock, D. T., Leibfried, D., Guina, M.
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ASJC Scopus subject areas: Atomic and Molecular Physics, and Optics
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Research output: Scientific › Paper, poster or abstract

Cavity enhanced absorption spectroscopy in the mid-infrared using a supercontinuum source

We demonstrate incoherent broadband cavity enhanced absorption spectroscopy in the mid-infrared wavelength range from 3000 to 3450 nm using an all-fiber based supercontinuum source. Multi-component gas detection is performed, and the concentrations of acetylene and methane are retrieved with sub-ppm accuracy. A linear response to nominal gas concentrations is observed, demonstrating the feasibility of the method for sensing applications.

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Organisations: Photonics, Research area: Optics, Research group: Applied Optics, Research group: Ultrafast Optics, Institut FEMTO-ST, UMR 6174 CNRS-Université de Franche-Comté
Authors: Amiot, C., Aalto, A., Ryczkowski, P., Toivonen, J., Genty, G.
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Scopus rating (2014): SJR 1.799 SNIP 1.462 CiteScore 3.25
Scopus rating (2013): SJR 2.149 SNIP 1.652 CiteScore 3.77
Scopus rating (2012): SJR 2.554 SNIP 1.754 CiteScore 3.76
Scopus rating (2011): SJR 2.805 SNIP 1.94 CiteScore 4.04
Scopus rating (2010): SJR 2.926 SNIP 1.789
Scopus rating (2009): SJR 2.857 SNIP 1.848
Scopus rating (2008): SJR 2.934 SNIP 1.83
Scopus rating (2007): SJR 3.039 SNIP 1.913
Scopus rating (2006): SJR 3.457 SNIP 2.288
The FinEstBeaMS beamline is under construction at the 1.5 GeV storage ring of the MAX IV Laboratory at Lund, Sweden. It has been designed to cover an unusually wide energy range from ultraviolet (4.3 eV) to soft X-rays (1000 eV) but experiment will also be possible at the Mg and Al Ka energies. Instead of having two insertion devices and a deferent optical scheme for low and high photon energy regions, we have based our design on a single long-period, elliptically polarizing undulator and a plane grating monochromator. This solution will provide very good conditions for planned experiments in the whole photon energy region. The beamline will have two branches: one will be used to investigate free atoms, molecules and clusters with photoelectron/photoion coincidence spectroscopy as well as solids with photoluminescence spectroscopy whereas the other one will be dedicated to ultra-high vacuum studies of surfaces and interphases, utilizing X-ray photoelectron spectroscopy and X-ray absorption spectroscopy. This paper focuses on the optical design of the beamline and general design concepts of the gasphase and solid-state end stations.
Progress in Power Scaling and Wavelength Coverage of VECSELs
The main concepts and recent results underpinning the rapid development of verticalexternal-cavity surface-emitting lasers (VECSELs) are reviewed. In particular, we focus on developments addressing new wavelength domains and emerging applications.

Broadband Anti-reflective Coatings for Multi-junction Solar Cells
The main concepts and recent results underpinning the rapid development of verticalexternal-cavity surface-emitting lasers (VECSELs) are reviewed. In particular, we focus on developments addressing new wavelength domains and emerging applications.
Computing thermal effects on nonlinear optical properties of small atoms
The significance of nonlinear optical properties (NOP) is pronounced in many physical scales starting from microscopic interactions, such as van der Waals, to macroscopic properties, like dielectric constant and refractive index. Obtaining NOP, that is, dipole and multipole moments and (hyper)polarizabilities of matter, by computational simulation is particularly important in systems beyond experimental reach, such as exotic light-nucleus molecules in warm dense matter present in stars and gas planets, or short life-time particles such as positron. Most first-principles approaches are straightforward in 0 K but become tedious in thermal ensembles and beyond the adiabatic approximation.

The path-integral Monte Carlo method (PIMC) provides a tangible interface between the tensorial and the thermally averaged character of molecular (hyper)polarizabilities. In a recent study [1], we have derived field-free estimators that make the computation even more straightforward than our previous finite-field approach [2]. With the adiabatic, i.e. Born–Oppenheimer, approximation we obtain accurate tensorial ground state (hyper)polarizabilities, while the non-adiabatic simulation adds in considerable rovibrational effects and thermal coupling. In case of several two-electron systems, our results at the 0 K limit are either novel or in excellent agreement with the literature (e.g., see Fig. 1). Besides these results, we are presenting the derivation and demonstration of yet unpublished estimators for dipole-quadrupole polarizabilities of small molecules.

Quantum Monte Carlo methods from ground state to thermal equilibrium and real-time propagation of electronic structure

Effect of growth parameters on the properties of GaAsBi

Investigation of the structural anisotropy in a self-assembling glycinate layer on Cu(100) by scanning tunneling microscopy and density functional theory calculations
Self-assembling organic molecule-metal interfaces exhibiting free-electron like (FEL) states offers an attractive bottom-up approach to fabricating materials for molecular electronics. Accomplishing this, however, requires detailed understanding of the fundamental driving mechanisms behind the self-assembly process. For instance, it is still unresolved as to why the adsorption of glycine ([NH2(CH2)COOH]) on isotropic Cu(100) single crystal surface leads, via deprotonation and self-assembly, to a glycinate ([NH2(CH2)COO–]) layer that exhibits anisotropic FEL behavior. Here, we report on bias-dependent scanning tunneling microscopy (STM) experiments and density functional theory (DFT) calculations for glycine adsorption on Cu(100) single crystal surface. We find that after physical vapor deposition (PVD) of glycine on Cu(100), glycinate self-assembles into an overlayer exhibiting c(2x4) and p(2x4) symmetries with non-identical adsorption sites. Our findings underscore the intricacy of electrical conductivity in nanomolecular organic overlayers and the critical role the structural anisotropy at molecule-metal interface plays in the fabrication of materials for molecular electronics.
Bulk second-harmonic generation from thermally evaporated indium selenide thin films

We investigate bulk second-order nonlinear optical properties of amorphous indium selenide thin films fabricated by thermal evaporation. Such films are shown to exhibit strong and photostable second-harmonic generation (SHG). We report strong thickness dependence of the second-harmonic signals as characterized by the Maker-fringe method. The absolute value of the nonlinear susceptibility tensor of the film is addressed by analyzing the interference of SHG signals from the film and the glass substrate. The value of the joint non-diagonal component of the susceptibility is found to be 4 pm/V, which is comparable to that of widely used second-order nonlinear materials.
Subjective and objective rating of impact sound insulation of a concrete floor with various coverings

The aim of the study was to determine the associations between subjective rating of impact sounds directed to concrete floors and various single-number quantities (SNQ) of impact sound insulation. A psychoacoustic experiment was participated by 55 subjects in order to rate subjectively 44 sounds which were recordings of five actual impact sound sources directed to nine floor types. Eight objective SNQs were calculated. The squared Pearson correlation coefficients $R^2$ was determined between the objective SNQs and subjective annoyance or loudness. Statistically significant correlation between the SNQs and subjective ratings was detected for three sound types out of five. Of the SNQs presented in ISO 717-2, the best indicators of subjective loudness and annoyance regarding walking with hard-heeled and soft-heeled shoes and chair moving were $L'n,w + CI$ and $L'n,w + CI , 50–2500$ followed by SNQs developed by Fasold, Gerretsen and Bodlund. $L'n,w$ and the SNQ developed by Hagberg correlated weaker with the subjective loudness and annoyance of the mentioned three sound types. The subjective ratings of walking with socks and superball bouncing were weakly or not at all correlated with the SNQs. As walking with socks is probably the most common impact sound type in some countries including the Nordic countries, the present SNQs do not cover all important sound types occurring in dwellings. Thus, there is a need for the development of new SNQs which would correlate better with general sound types.

General information
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Organisations: Civil Engineering, Research group: Building Acoustics
Authors: Kylliäinen, M., Hongisto, V., Oliva, D., Rekola, L.
Pages: 236-251
Publication date: 1 Mar 2017
Peer-reviewed: Yes
1180 nm GaInNAs quantum well based high power DBR laser diodes

We report state-of-the-art results for 1180nm (narrow linewidth) laser diodes based on GaInNAs quantum wells and show results for ridge waveguide DBR laser diode including its reliability tests. Manuscript demonstrates 500 mW output power in continuous-wave operation at room temperature, wide single mode tuning region and narrow linewidth operation. Devices reached narrow linewidth operation (>250 kHz) across their operation band.

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Organisations: Photonics
Authors: Viheriälä, J., Aho, A., Virtanen, H., Koskinen, M., Dumitrescu, M., Guina, M.
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Publication series
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ASJC Scopus subject areas: Physics and Astronomy (miscellaneous)
Keywords: DBR laser, dbr, 1180nm, 1178nm, 1154nm, SHG
DOIs: 10.1117/12.2251317

Bibliographical note
INT="Koskinen, Mervi"
Multi-wavelength mid-IR light source for gas sensing

Abstract: state-of-the-art 560 mW output power in continuous-wave operation at room temperature. The maximum CW power varies between 210mW and 660mW when the ambient temperature is changed between 5 and 80 °C. The emission spectrum variation with the bias current is shown in Fig. 2. Preliminary results from tapered RWG-LDs on the other hand show output power up to 2750mW at 10A current with narrow spectrum locked to the grating (not shown).

1180 nm GainNAs quantum well based high power DBR laser diodes
Abstract: state-of-the-art 560 mW output power in continuous-wave operation at room temperature. The maximum CW power varies between 210mW and 660mW when the ambient temperature is changed between 5 and 80 °C. The emission spectrum variation with the bias current is shown in Fig. 2. Preliminary results from tapered RWG-LDs on the other hand show output power up to 2750mW at 10A current with narrow spectrum locked to the grating (not shown).

31% European InGaP/GaAs/InGaNAs Solar Cells For Space Application
We report a triple junction InGaP/GaAs/InGaNAs solar cell with efficiency of ~31% at AM0, 25 °C fabricated using a combined molecular beam epitaxy (MBE) and metal-organic chemical vapour deposition (MOCVD) processes. The prototype cells comprise of InGaNAs (Indium Gallium Nitride Arsenide) bottom junction grown on a GaAs (Gallium Arsenide) substrate by MBE and middle and top junctions deposited by MOCVD. Repeatable cell characteristics and uniform efficiency pattern over 4-inch wafers were obtained. Combining the advantages offered by MBE and MOCVD opens a new perspective for fabrication of high-efficiency space tandem solar cells with three or more junctions. Results of radiation resistance of the sub-cells are also presented and critically evaluated to achieve high efficiency in EOL conditions.
**Advances of GaAs laser diode technology for photonic integration**

**General information**
- **State:** Published
- **Organisations:** Photonics
- **Authors:** Guina, M., Isoaho, R., Aho, A., Tukiainen, A., Tuorila, H., Viheriälä, J.
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- **Peer-reviewed:** Unknown
- **Event:** Paper presented at 19th European Workshop on Molecular Beam Epitaxy, St. Petersburg.

**Research output:** Scientific - peer-review → Conference contribution

**Binary phase shaping for nonlinear microscopy of GaAs nanowires**

**General information**
- **State:** Published
- **Organisations:** Photonics, Research area: Optics, Research group: Nonlinear Optics, Research group: Nonlinear Optics
- **Authors:** Turquet, L., Kakko, J., Karvonen, L., Jiang, H., Isotalo, T., Huhtio, T., Niemi, T., Kauppinen, E., Lipsanen, H., Kauranen, M., Bautista, G.
- **Number of pages:** 1
- **Publication date:** 2017
- **Peer-reviewed:** Unknown
- **Event:**
- **Links:**
  - [https://www-user.tu-chemnitz.de/~rodc/Optical_NanoSpectroscopy_IV/Program.html](https://www-user.tu-chemnitz.de/~rodc/Optical_NanoSpectroscopy_IV/Program.html) (Conference webpage)

**Research output:** Scientific → Paper, poster or abstract

**Composition and Bandgap determination of MBE-grown GaInNAsSb**

**General information**
- **State:** Published
- **Ministry of Education publication type:** D3 Professional conference proceedings
- **Organisations:** Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Department of Materials Science
- **Authors:** Aho, A., Korpijärvi, V., Isoaho, R., Malinen, P., Tukiainen, A., Honkanen, M. H., Guina, M.
- **Publication date:** 2017

**Host publication information**
- **Title of host publication:** 19th International Conference on Molecular-Beam Epitaxy

**Bibliographical note**
- **Proceeding ilm. 1.2.2017:** [https://mbe2016.sciencesconf.org/resource/page/id/6 HO/2.1.2017](https://mbe2016.sciencesconf.org/resource/page/id/6)
- **Research output:** Professional → Conference contribution
Design considerations on GaInNAs solar cells with back surface reflectors

We report on modeling of electrical characteristics of dilute nitride GaInNAs solar cells with specular and diffuse back surface reflectors. The paper concentrates on optimization of the GaInNAs junction thickness and doping level for various reflectors. Usually, it is considered that the doping level of GaInNAs should be clearly below $1 \times 10^{16}$ cm$^{-3}$ to be usable for active sub-junction material of high-efficiency triple junction solar cells. Here we show that this requirement can be alleviated by using high quality diffuse back surface reflectors and thus GaInNAs with background doping levels even exceeding $1 \times 10^{16}$ cm$^{-3}$ can be used for junction formation for high-efficiency multijunction solar cells. The reflectance of the back surface reflector is shown to affect the optimal GaInNAs thickness. The higher the reflectance the thinner layers can be used. We also show that the optimal GaInNAs layer thickness is different depending on whether the optimization is done for the short circuit current density or open circuit voltage.

General information
State: Published
Organisations: Photonics
Authors: Tukiainen, A., Aho, A., Aho, T., Polojarvi, V., Guina, M.
Publication date: 2017
Peer-reviewed: Unknown
Research output: Scientific › Paper, poster or abstract

Development process of novel high-power 750 nm direct emitting VECSELs

General information
State: Published
Organisations: Photonics, Research group: ORC
Authors: Nechay, K., Saarinen, E., Ranta, S., Penttinen, J., Tukiainen, A., Guina, M.
Publication date: 2017
Peer-reviewed: Unknown
Event: Paper presented at Optics and Photonics days 2017, Oulu, Finland.
Research output: Scientific › Paper, poster or abstract

Dilute Nitride Solar Cells - Technology Developments Towards 50% Efficiency

General information
State: Published
Organisations: Photonics
Authors: Guina, M., Tukiainen, A., Aho, A., Polojarvi, V.
Publication date: 2017
Peer-reviewed: Unknown
Research output: Scientific › Paper, poster or abstract

Four Junction Dilute Nitride Solar Cells for Next Generation CPV-systems

General information
State: Published
Organisations: Photonics
Authors: Aho, A., Isoaho, R., Aho, T., Raappana, M., Polojarvi, V., Tukiainen, A., Guina, M.
Publication date: 2017
Peer-reviewed: Unknown
Research output: Scientific › Paper, poster or abstract

High-power 1550 nm tapered DBR laser diodes for LIDAR applications

Pulsed operation characteristics of a high-power 1550 nm tapered distributed Bragg Reflector (DBR) laser diode are described. The development targets applications such as LIDAR and range finding, which require eye-safe, coherent light sources with a high peak-power. In particular, we employ a regrowth-free technique and AlGaInAs/InP gain structure, and demonstrate a peak power of about 1.6 W (drive-current limited) and a CW power of 560 mW at room temperature.

General information
State: Published
Organisations: Photonics
Improved corrosion properties of Hot Dip Galvanized Steel by nanomolecular silane layers as hybrid interface between zinc and top coatings

Thin organic coatings (TOC) or paints on hot dip galvanized steel (HDGS) improve the corrosion properties and create visually pleasing surfaces. Delamination of these coatings lead to corrosion and peeling of the paints. Hence, a novel method for improved adhesion and corrosion properties for HDGS surfaces is introduced. It is shown how the fabrication of a nanomolecular silane film as an interfacial layer between the HDGS and TOC or paint improves the corrosion properties of HDGS in different pH regimes. Understanding the corrosion behavior of ultra-thin silane layers under differing pH is crucial as subsequent coatings have different pHs. By varying the silanization parameters two different nanomolecular surface structures of aminopropyl trimethoxysilane (APS) on HDGS were fabricated: well-ordered monolayers with approximately 1 nm thickness and highly clustered APS films with a thickness in the range of 5-8 nm. To verify the nanomolecular APS structures, photoelectron spectroscopy (PES) and contact angle (CA) measurements were employed. The corrosion properties of HDGS and silanized HDGS were studied with linear sweep voltammetry (LSV) and electrochemical impedance spectroscopy (EIS). It is shown that at pH 5 and 7 passivation behavior is observed on silanized samples but the most significant improvement in corrosion resistance is found at pH 10 where the corrosion currents of silanized samples are up to two orders of magnitude lower than on uncoated metallic samples. Also, it is demonstrated that the corrosion inhibition of APS is not only dependent on the thickness of the silane film, but also the molecular ordering at the surface. The thin, well-ordered APS monolayer is more resistant towards corrosion in NaCl.
solution (pH 7) than thicker clustered APS layer. This indicates that the highly ordered nanomolecular surface structure protects the HDGS-silane interface from the Cl- adsorption better than the thicker, but more randomly ordered APS layers. Nanomolecular interfacial silane films for enhanced corrosion and adhesion properties on HDGS are transferrable to industrial production lines providing a low cost and environmentally friendly method for improved HDGS products.

**General information**

State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Surface Science, MAX IV Laboratory, Lund University
Authors: Vuori, L., Ali-Löytty, H., Lahtonen, K., Hannula, M., Lehtonen, E., Niu, Y., Valden, M.
Publication date: 2017
Peer-reviewed: Yes

**Publication information**

Journal: Corrosion
Volume: 73
Issue number: 2
ISSN (Print): 0010-9312

Ratings:
Scopus rating (2016): SJR 1.093 SNIP 1.465 CiteScore 2.02
Scopus rating (2015): SJR 0.864 SNIP 1.506 CiteScore 1.61
Scopus rating (2014): SJR 0.469 SNIP 0.841 CiteScore 0.92
Scopus rating (2013): SJR 0.493 SNIP 1.194 CiteScore 0.77
Scopus rating (2012): SJR 0.479 SNIP 0.886 CiteScore 0.67
Scopus rating (2011): SJR 0.586 SNIP 1.404 CiteScore 1.03
Scopus rating (2010): SJR 0.707 SNIP 1.387
Scopus rating (2009): SJR 0.912 SNIP 1.573
Scopus rating (2008): SJR 0.793 SNIP 1.056
Scopus rating (2007): SJR 0.983 SNIP 1.199
Scopus rating (2006): SJR 0.89 SNIP 1.229
Scopus rating (2005): SJR 1.104 SNIP 1.421
Scopus rating (2004): SJR 1.122 SNIP 1.441
Scopus rating (2003): SJR 0.957 SNIP 1.771
Scopus rating (2002): SJR 1.149 SNIP 1.574
Scopus rating (2001): SJR 1.541 SNIP 1.792
Scopus rating (2000): SJR 1.028 SNIP 2.089
Scopus rating (1999): SJR 1.051 SNIP 1.574

Original language: English
ASJC Scopus subject areas: Surfaces and Interfaces, Surfaces, Coatings and Films, Electrochemistry

DOIs:
10.5006/2206
Research output: Scientific - peer-review › Article

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**Key steps in unconventional secretion of fibroblast growth factor 2 reconstituted with purified components**

FGF2 is secreted from cells by an unconventional secretory pathway. This process is mediated by direct translocation across the plasma membrane. Here, we define the minimal molecular machinery required for FGF2 membrane translocation in a fully reconstituted inside-out vesicle system. FGF2 membrane translocation is thermodynamically driven by PI(4,5)P2-induced membrane insertion of FGF2 oligomers. The latter serve as dynamic translocation intermediates of FGF2 with a subunit number in the range of 8-12 FGF2 molecules. Vectorial translocation of FGF2 across the membrane is governed by sequential and mutually exclusive interactions with PI(4,5)P2 and heparan sulfates on opposing sides of the membrane. Based on atomistic molecular dynamics simulations, we propose a mechanism that drives PI(4,5)P2 dependent oligomerization of FGF2. Our combined findings establish a novel type of self-sustained protein translocation across membranes revealing the molecular basis of the unconventional secretory pathway of FGF2.

**General information**

State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Physics, Research area: Computational Physics, Research group: Biological Physics and Soft Matter
Authors: Steringer, J. P., Lange, S., Cujova, S., Sachl, R., Poojari, C., Lolicato, F., Beutel, O., Müller, H., Unger, S., Coskun, U., Honigmann, A., Vattulainen, I., Hof, M., Freund, C.
Lasitettujen parvekkeiden ääneneristävyyden suunnitteluohje

General information
State: Published
Organisations: Civil Engineering, A Insinoorit Suunnittelu Oy
Authors: Kovalainen, V. J. J., Kylliäinen, M., Huhtala, T.
Pages: 111-116
Publication date: 2017
Peer-reviewed: Unknown
ASJC Scopus subject areas: Acoustics and Ultrasonics
Keywords: balcony, acoustics, sound insulation, noise control
Research output: Scientific › Paper, poster or abstract

Novel III-V Heterostructures for High Efficiency Solar Cells

General information
State: Published
Organisations: Photonics
Authors: Polojärvi, V., Aho, A., Tukiainen, A., Raappana, M., Aho, T., Isoaho, R., Guina, M.
Publication date: 2017
Peer-reviewed: Unknown
Event: Paper presented at Optics and Photonics days 2017, Oulu, Finland.
Research output: Scientific › Paper, poster or abstract

Observation of the longitudinal electric field of Bessel beams using nonlinear microscopy

General information
State: Published
Organisations: Photonics, Research area: Optics, Research group: Nonlinear Optics
Authors: Turquet, L., Kakko, J., Karvonen, L., Jiang, H., Kauppinen, E., Lipsanen, H., Bautista, G., Kauranen, M.
Publication date: 2017
Peer-reviewed: Unknown
Event: Paper presented at Optics and Photonics days 2017, Oulu, Finland.
Links:
Research output: Scientific › Paper, poster or abstract
Performance of Dilute Nitride Triple Junction Space Solar Cell Grown by MBE

Dilute nitride arsenide antimonide compounds offer widely tailorable band-gaps, ranging from 0.8 eV to 1.4 eV, for the development of lattice-matched multijunction solar cells with three or more junctions. Here we report on the performance of GaInP/GaAs/GaInNAsSb solar cell grown by molecular beam epitaxy. An efficiency of 27% under AM0 conditions is demonstrated. In addition, the cell was measured at different temperatures. The short circuit current density exhibited a temperature coefficient of 0.006 mA/cm²/°C while the corresponding slope for the open circuit voltage was −6.8 mV/°C. Further efficiency improvement, up to 32%, is projected by better current balancing and structural optimization.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Photonics, Research group: ORC
Authors: Aho, A., Isoaho, R., Tukiainen, A., Polojärvi, V., Raappana, M., Aho, T., Guina, M.
Publication date: 2017

Host publication information
Title of host publication: 11th European Space Power Conference, 3-7 October 2016 Thessaloniki, Greece
Publisher: EDP Sciences
Article number: 03008

Publication series
Name: E3S Web of Conferences
Volume: 16
ISSN (Electronic): 2267-1242
Electronic versions:
e3sconf_espc2017_03008
DOIs: 10.1051/e3sconf/20171603008
Research output: Scientific - peer-review › Conference contribution

Performance and lifetime of high-power narrow-linewidth 1180 nm GaInNAs DBR-LDs

We report the highest power narrow spectrum 1180 nm distributed Bragg reflector (DBR) laser diodes prepared using GaInNAs quantum wells as a gain material. In particular, we demonstrate a CW output power up to 560 mW from Ridge Waveguide (RWG)-DBR laser diodes and up to 2.75W for Tapered DBR-LDs. The demonstration targets applications in second harmonic generation (SHG) for generating high brightness yellow radiation. RWG-DBR LDs are optimal light sources for waveguide SHG-crystals allowing high efficiency coupling to single mode WG embedded in the SHG-crystal. On the other hand, tapered DBR-LDs provide a power level that suitable for bulk SHG-crystals that can withstand more IR-light and alleviate the need for waveguide alignment. To reach the 1180 nm range we have developed high-quality GaInNAs quantum wells embedded in GaAs waveguide, a material system that has been in the past recognized for poor reliability in laser operation. In our case, preliminary lifetime test for GaInNAs RWG-DBR LDs showed no signs of degradation in a room-temperature operation for over 2000 hours under high current driving at 1500 mA drive-current.

General information
State: Published
Organisations: Photonics
Authors: Viheriälä, J., Aho, A., Virtanen, H., Koskinen, M., Guina, M.
Publication date: 2017
Peer-reviewed: Unknown
ASJC Scopus subject areas: Physics and Astronomy (miscellaneous)
Keywords: 1180nm, 1178nm, 1154nm, DBR, laser diode, high power, narrow linewidth
DOIs: 10.1109/CLEOE-EQEC.2017.8086374

Bibliographical note
INT="Koskinen, Mervi"
Research output: Scientific › Paper, poster or abstract

Plasmonic and photonic resonances of nonlinear metasurfaces
Quantum-Well Laser Emitting at 1.2 µm-1.3 µm Window Monolithically Integrated on Ge Substrate
We report a quantum-well laser diode monolithically integrated on Ge substrate. The gain is provided by two GaInNAsSb/GaAs quantum-wells with emission at 1200 nm-1300 nm. The diode exhibits continuous-wave operation with mW-level output power at room temperature.

Temperature Dependent Characteristics of GaInP/GaAs/GaInNAsSb Solar Cell Under Simulated AM0 Spectra
We report on the temperature characteristics of GaInP/GaAs/GaInNAsSb triple junction solar cell monolithically grown by molecular beam epitaxy. We have measured the temperature dependent light-biased current-voltage characteristics for simulated AM0 spectral conditions using two simulators: a customized three band source and a Xenon lamp with AM0 filter. The current-voltage characteristics of the cell were measured in temperature range of 25-90°C with both solar simulators. At 25°C the cell demonstrated active area efficiencies of 26.7% and 21.1% when illuminated with the three band simulator and Xenon source, respectively. Significant deviations between the measurements were observed as the cell demonstrated approximately 30% lower short-circuit current density when illuminated with the Xenon source compared to the measurement made with the three band simulator. The temperature coefficients for the cell characteristics were determined from the temperature dependent current-voltage data. For the three band simulator, the temperature coefficients for short-circuit current density and open-circuit voltage of the cell were found to be 5.3 µA/cm²/°C and -6.8 mV/°C, respectively, and are in agreement with results reported for GaInP/GaAs/Ge solar cells. Illumination with filtered Xenon lamp leads to significantly higher temperature coefficient for short-circuit current density. The conversion efficiency of the cell decreased with a slope of -0.068 abs.-%/°C when illuminated with the three band simulator.

Vectorial second-harmonic generation imaging with Bessel beams
Enhancement of Photocurrent in GaInNAs Solar Cells using Ag/Cu Double-Layer Back Reflector

General information
State: E-pub ahead of print
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Research group: Nanophotonics
Authors: Aho, T., Aho, A., Tukiainen, A., Polojärvi, V., Salminen, T., Raappana, M., Guina, M.
Publication date: 22 Dec 2016
Peer-reviewed: Yes

Publication information
Volume: 109
Article number: 251104
ISSN (Print): 0003-6951
Ratings:
Scopus rating (2016): CiteScore 2.67 SJR 1.132 SNIP 0.996
Scopus rating (2015): SJR 1.085 SNIP 0.983 CiteScore 2.47
Scopus rating (2014): SJR 1.799 SNIP 1.462 CiteScore 3.25
Scopus rating (2013): SJR 2.149 SNIP 1.652 CiteScore 3.77
Scopus rating (2012): SJR 2.554 SNIP 1.754 CiteScore 3.76
Scopus rating (2011): SJR 2.805 SNIP 1.94 CiteScore 4.04
Scopus rating (2010): SJR 2.926 SNIP 1.789
Scopus rating (2009): SJR 2.857 SNIP 1.848
Scopus rating (2008): SJR 2.934 SNIP 1.83
Scopus rating (2007): SJR 3.039 SNIP 1.913
Scopus rating (2006): SJR 3.457 SNIP 2.288
Scopus rating (2005): SJR 3.709 SNIP 2.382
Scopus rating (2004): SJR 3.904 SNIP 2.38
Scopus rating (2003): SJR 3.765 SNIP 2.27
Scopus rating (2002): SJR 3.917 SNIP 2.356
Scopus rating (2001): SJR 4.111 SNIP 2.212
Scopus rating (2000): SJR 4.277 SNIP 2.013
Scopus rating (1999): SJR 4.35 SNIP 2.11
Original language: English

Enhancement of photocurrent in GaInNAs solar cells using Ag/Cu double-layer back reflector

Fabrication of Ion-Shaped Anisotropic Nanoparticles and their Orientational Imaging by Second-Harmonic Generation Microscopy

Ion beam shaping is a novel and powerful tool to engineer nanocomposites with effective threedimensional (3D) architectures. In particular, this technique offers the possibility to precisely control the size, shape and 3D orientation of metallic nanoparticles at the nanometer scale while keeping the particle volume constant. Here, we use swift heavy ions of xenon for irradiation in order to successfully fabricate nanocomposites consisting of anisotropic gold nanoparticle that are oriented in 3D and embedded in silica matrix. Furthermore, we investigate individual nanorods using a nonlinear optical microscope based on second-harmonic generation (SHG). A tightly focused linearly or radially-polarized
laser beam is used to excite nanorods with different orientations. We demonstrate high sensitivity of the SHG response for these polarizations to the orientation of the nanorods. The SHG measurements are in excellent agreement with the results of numerical modeling based on the boundary element method.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research area: Optics, Research group: Nonlinear Optics, Optoelectronics
Research Centre, Research group: Nanophotonics, Ecole Polytechnique, Laboratoire de Photonique et Nanosciences, CNRS, Marcoussis, France. Laboratoire de Physique des Solides CNRS/UMR8502, Bâtiment 510, University Paris-Sud, Orsay, 91405, France. Laboratoire des Solides Irradiés, Ecole Polytechnique, CEA/DRF/IRAMIS, CNRS, Université Paris-Saclay, Route de Saclay, 91128, Palaiseau, France.
Authors: Slablab, A., Isotalo, T. J., Mäkitalo, J., Turquet, L., COULON, P., Niemi, T., Ulysse, C., Kociak, M., Mailly, D., Rizza, G., Kaaranen, M.
Number of pages: 10
Publication date: 24 Nov 2016
Peer-reviewed: Yes

Publication information
Journal: Scientific Reports
Volume: 6
Issue number: 37469
Article number: 37469
ISSN (Print): 2045-2322
Ratings:
Scopus rating (2016): CiteScore 4.63 SJR 1.625 SNIP 1.401
Scopus rating (2015): SJR 2.057 SNIP 1.684 CiteScore 5.3
Scopus rating (2014): SJR 2.103 SNIP 1.544 CiteScore 4.75
Scopus rating (2013): SJR 1.886 SNIP 1.51 CiteScore 4.06
Scopus rating (2012): SJR 1.458 SNIP 0.896 CiteScore 2.44
Original language: English
Keywords: optics, plasmonics, Nonlinear microscopy, IRRADIATION
ASJC Scopus subject areas: Atomic and Molecular Physics, and Optics
Electronic versions:
slablab et al. 2016
DOI:
10.1038/srep37469
Links:
http://urn.fi/URN:NBN:fi:tty-201612154861
Research output: Scientific - peer-review › Article

VECSEL systems for the generation and manipulation of trapped magnesium ions
Experiments in atomic, molecular, and optical (AMO) physics rely on lasers at many different wavelengths and with varying requirements on the spectral linewidth, power, and intensity stability. Vertical external-cavity surface-emitting lasers (VECSELs), when combined with nonlinear frequency conversion, can potentially replace many of the laser systems currently in use. Here, we present and characterize VECSEL systems that can perform all laser-based tasks for quantum information processing experiments with trapped magnesium ions. For the photoionization of neutral magnesium, 570.6 nm light is generated with an intracavity frequency-doubled VECSEL containing a lithium triborate crystal. External frequency doubling produces 285.3 nm light for a resonant interaction with the 1S0→1P1 transition of neutral Mg. Using an externally frequency-quadrupled VECSEL, we implement Doppler cooling of Mg25+ on the 279.6 nm 2S1/2→2P3/2 cycling transition, repumping on the 280.4 nm 2S1/2→2P1/2 transition, coherent state manipulation, and resolved sideband cooling close to the motional ground state. Our systems serve as prototypes for applications in AMO requiring single-frequency, power-scalable laser sources at multiple wavelengths.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, National Institute of Standards and Technology, Time and Frequency Division, Boulder, Colorado
Number of pages: 6
Pages: 1294-1299
Publication date: 8 Nov 2016
UPS and DFT investigation of the electronic structure of gas-phase trimesic acid

Benzene-1,3,5-tricarboxylic acid (trimesic acid, TMA) molecules in gas-phase have been investigated by using valence band photoemission. The photoelectron spectrum in the binding energy region from 9 to 22 eV is interpreted based on the density functional theory calculations. The electronic configuration that makes contribution to each transition is demonstrated. Furthermore, electronic structure of TMA is compared with benzene and benzoic acid (BA) in order to demonstrate changes in molecular orbital energies induced by addition of carboxyl groups to benzene ring.
Elastic-Plastic Transition in MBE-Grown GaSb Semiconducting Crystal Examined by Nanoindentation

General information

State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Univ Helsinki, University of Helsinki, Dept Phys, Aalto University, Department of Materials Science and Engineering, Institute of Materials Science, University of Silesia, 75 Pułku Piechoty 1, 45-500 Chorzów, Poland, Institute of Physics, University of Silesia, 75 Pułku Piechoty 1, 45-500 Chorzów, Poland
Authors: Majtyka, A., Trębala, M., Tukiainen, A., Chrobak, D., Borgieł, W., Räisänen, J., Nowak, R.
Number of pages: 3
Pages: 1131-1133
Publication date: 1 Oct 2016
Peer-reviewed: Yes

Publication information

Journal: Acta Physica Polonica A
Volume: 130
Issue number: 4
ISSN (Print): 0587-4246
Ratings:
Scopus rating (2016): SJR 0.235 SNIP 0.411 CiteScore 0.51
Scopus rating (2015): SJR 0.267 SNIP 0.493 CiteScore 0.56
Scopus rating (2014): SJR 0.276 SNIP 0.614 CiteScore 0.6
Scopus rating (2013): SJR 0.345 SNIP 0.556 CiteScore 0.63
Scopus rating (2012): SJR 0.287 SNIP 0.575 CiteScore 0.54
Scopus rating (2011): SJR 0.254 SNIP 0.471 CiteScore 0.43
Scopus rating (2010): SJR 0.289 SNIP 0.409
Scopus rating (2009): SJR 0.262 SNIP 0.419
Scopus rating (2008): SJR 0.225 SNIP 0.316
Scopus rating (2007): SJR 0.29 SNIP 0.449
Scopus rating (2006): SJR 0.283 SNIP 0.333
Scopus rating (2005): SJR 0.273 SNIP 0.391
Scopus rating (2004): SJR 0.345 SNIP 0.406
Scopus rating (2003): SJR 0.25 SNIP 0.325
Scopus rating (2002): SJR 0.28 SNIP 0.356
Scopus rating (2001): SJR 0.324 SNIP 0.416
Scopus rating (2000): SJR 0.313 SNIP 0.362
Scopus rating (1999): SJR 0.341 SNIP 0.282
Original language: English
DOIs: 10.12693/APhysPolA.130.1131

Bibliographical note
JUFOID=50342
Research output: Scientific - peer-review › Article

Lipid membranes: Theory and simulations bridged to experiments

General information
Imaging of the Second-harmonic Response of Spatially-oriented Individual Ion-shaped Nanoparticles

During the last decade, many efforts have been made to develop techniques to integrate nanostructures in functional matrices. This activity, mainly boosted by advances in nanofabrication, has enabled the development of elegant methods for the development of planar nanodevices. However, the design and implementation of embedded three-dimensional (3D) nano-architectures with tunable spatial orientation remains a challenge. To overcome this difficulty, an alternative is offered by the technique of sculpturing nanoparticles using ion beams (ion-beam shaping). Here, we use this method to produce an array of anisotropic and spatially-oriented gold nanoparticles embedded in silica matrix. Their orientation is then imaged by nonlinear optical microscopy based on second-harmonic generation and polarized optical beams. The arrays of gold nanoparticles were fabricated by first preparing an array of spherical particles in silica matrix. These particles were then illuminated by a beam of xenon ions. Depending on the total ion fluence, the gold particle elongate along the direction of irradiation, while maintaining constant volume, allowing nanorods and even nanowires to be fabricated. The tilt angle of the particles was adjusted by the direction of ion irradiation.

Second-harmonic microscopy of nanorods was based on using linearly and radially polarized beams focused by a high-numerical-aperture objective. This technique allows the transverse and longitudinal field components in the focus to be controlled. This in turn affects the coupling of the incident light to the nanorods with different orientations. We report the high sensitivity of the second-harmonic response to the orientation of the nanorods for different states of polarization. The experimental results were obtained to be in very good agreement with simulations based on the boundary-element method. Compared with previous
reports, our results provide a considerable improvement for understanding the interaction of highly focused beams with anisotropic sub-wavelength structures.

Temperature and quantum effects on hydrogen–metal cluster interaction

General information
State: Published
Organisations: Department of Physics, Research group: Electronic Structure Theory, Research area: Computational Physics, Research group: Materials and Molecular Modeling
Authors: Leino, M., Rantala, T. T., Wang, J.
Number of pages: 1
Publication date: Aug 2016
Peer-reviewed: Unknown
Event: Paper presented at International Symposium on Small Particles and Inorganic Clusters XVIII, Jyväskylä, Finland.
Research output: Scientific › Paper, poster or abstract

Improved antifouling properties and selective biofunctionalization of stainless steel by employing heterobifunctional silane-polyethylene glycol overlayers and avidin-biotin technology

A straightforward solution-based method to modify the biofunctionality of stainless steel (SS) using heterobifunctional silane-polyethylene glycol (silane-PEG) overlayers is reported. Reduced nonspecific biofouling of both proteins and bacteria onto SS and further selective biofunctionalization of the modified surface were achieved. According to photoelectron spectroscopy analyses, the silane-PEGs formed less than 10 Å thick overlayers with close to 90% surface coverage and reproducible chemical compositions. Consequently, the surfaces also became more hydrophilic, and the observed non-specific biofouling of proteins was reduced by approximately 70%. In addition, the attachment of E. coli was reduced by more than 65%. Moreover, the potential of the overlayer to be further modified was demonstrated by successfully coupling biotinylated alkaline phosphatase (bAP) to a silane-PEG-biotin overlayer via avidin-biotin bridges. The activity of the immobilized enzyme was shown to be well preserved without compromising the achieved antifouling properties. Overall, the simple solution-based approach enables the tailoring of SS to enhance its activity for biomedical and biotechnological applications.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Surface Science, BioMediTech, University of Jyväskylä, Department of Physics, NanoScience Center
Publication date: 6 Jul 2016
Peer-reviewed: Yes
We present a widely scalable, high temperature post-growth annealing method for converting ultra-thin films of TiO$_2$ grown by atomic layer deposition to topographically microstructured titanium silicide (TiSi). The photoemission electron microscopy results reveal that the transformation from TiO$_2$ to TiSi at 950 °C proceeds via island formation. Inside the islands, TiO$_2$ reduction and Si diffusion play important roles in the formation of the highly topographically microstructured TiSi interface with laterally nonuniform barrier height contact. This is advantageous for efficient charge transfer in Si-based heterostructures for photovoltaic and photoelectrochemical applications.

**General information**

**State:** Published  
**Ministry of Education publication type:** A1 Journal article-refereed  
**Organisations:** Optoelectronics Research Centre, Research group: Surface Science, Research group: Nanophotonics, MAX IV Laboratory, Lund University  
**Authors:** Hannula, M., Lahtonen, K., Ali-Löytty, H., Zakharov, A., Isotalo, T., Saari, J., Valden, M.  
**Number of pages:** 6  
**Pages:** 76-81  
**Publication date:** Jul 2016  
**Peer-reviewed:** Yes

**Publication Information**

**Journal:** Scripta Materialia  
**Volume:** 119  
**ISSN (Print):** 1359-6462  
**Ratings:**  
Scopus rating (2016): SJR 1.901 SNIP 1.696 CiteScore 3.71  
Scopus rating (2015): SJR 2.3 SNIP 1.876 CiteScore 3.54  
Scopus rating (2014): SJR 2.744 SNIP 2.124 CiteScore 3.55  
Scopus rating (2013): SJR 2.347 SNIP 1.975 CiteScore 3.19  
Scopus rating (2012): SJR 2.309 SNIP 2.022 CiteScore 3.01  
Scopus rating (2011): SJR 2.333 SNIP 2.108 CiteScore 3.21  
Scopus rating (2010): SJR 2.445 SNIP 2.125  
Scopus rating (2009): SJR 2.574 SNIP 2.02  
Scopus rating (2008): SJR 2.634 SNIP 2.128  
Scopus rating (2007): SJR 2.229 SNIP 2.174  
Scopus rating (2006): SJR 2.1 SNIP 1.915  
Scopus rating (2005): SJR 1.831 SNIP 1.915  
Scopus rating (2004): SJR 1.464 SNIP 1.731  
Scopus rating (2003): SJR 1.499 SNIP 1.709  
Scopus rating (2002): SJR 1.509 SNIP 1.345  
Scopus rating (2001): SJR 1.301 SNIP 1.361  
Scopus rating (2000): SJR 1.268 SNIP 1.123  
Scopus rating (1999): SJR 1.53 SNIP 1.162  
**Original language:** English  
**Keywords:** Atomic layer deposition (ALD), X-ray photoelectron spectroscopy (XPS), Transition metal silicides, Semiconductors, Surface modification  
**DOIs:**
Hämeen Pohjan konserttisali – akustiikkansa puolesta paras Tampereella.

General information
State: Published
Ministry of Education publication type: E1 Popularised article, newspaper article
Organisations: Department of Civil Engineering, Research group: Building Acoustics, Tampere University of Technology
Authors: Valjakka, S., Kylliäinen, M.
Pages: 24-27
Publication date: Jul 2016
Peer-reviewed: Unknown

Publication information
Journal: Tammerkoski
Issue number: 5
Original language: Finnish
Keywords: acoustics, room acoustics, concert halls, history of technology
ASJC Scopus subject areas: Acoustics and Ultrasonics

Bibliographical note
aux=rak,"Valjakka, Saveli"
Research output: General public › Article

Lattice Effects in Second-Harmonic Generation From Metasurfaces

General information
State: Published
Organisations: Department of Physics, Research area: Optics, Research group: Nonlinear Optics
Authors: Czaplicki, R., Kiviniemi, A., Laukkanen, J., Lehtolahti, J., Kuittinen, M., Kauranen, M.
Publication date: Jul 2016
Peer-reviewed: Unknown
Event: Paper presented at 18th International Conference on Transparent Optical Networks, Trento, Italy.

Bibliographical note
INT=fys,"Kiviniemi, Antti"
Research output: Professional › Paper, poster or abstract

Optically Enhanced GainNAs Solar Cell

General information
State: Published
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications
Authors: Aho, T. A., Aho, A., Tukiainen, A., Polojarvi, V., Raappana, M., Guina, M.
Publication date: 20 Jun 2016
Peer-reviewed: Unknown
Research output: Scientific › Paper, poster or abstract

High-efficiency GaInP/GaAs/GaInNAs solar cells grown by combined MBE-MOCVD technique

Triple-junction GaInP/GaAs/GaInNAs solar cells with conversion efficiency of ~29% at AM0 are demonstrated using a combination of molecular beam epitaxy (MBE) and metal-organic chemical vapor deposition (MOCVD) processes. The bottom junction made of GaInNAs was first grown on a GaAs substrate by MBE and then transferred to an MOCVD system for subsequent overgrowth of the two top junctions. The process produced repeatable cell characteristics and uniform efficiency pattern over 4-inch wafers. Combining the advantages offered by MBE and MOCVD opens a new perspective for fabrication of high-efficiency tandem solar cells with three or more junctions.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, CESI S.p.A.
Authors: Tukiainen, A., Aho, A., Gori, G., Polojärvi, V., Casale, M., Greco, E., Isoaho, R., Aho, T., Raappana, M., Campesato, R., Guina, M.
Number of pages: 6
Pages: 914-919
Publication date: 17 Jun 2016
Peer-reviewed: Yes

Publication information
Journal: Progress in Photovoltaics: Research and Applications
Volume: 24
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Article number: PIP2784
ISSN (Print): 1062-7995

Ratings:
Scopus rating (2016): SJR 2.224 SNIP 2.694 CiteScore 6.54
Scopus rating (2015): SJR 2.78 SNIP 3.33 CiteScore 7.31
Scopus rating (2014): SJR 3.279 SNIP 3.874 CiteScore 7.7
Scopus rating (2013): SJR 3.974 SNIP 5.653 CiteScore 8.93
Scopus rating (2012): SJR 3.478 SNIP 5.082 CiteScore 6.81
Scopus rating (2011): SJR 3.251 SNIP 5.999 CiteScore 6.81
Scopus rating (2010): SJR 3.749 SNIP 4.317
Scopus rating (2009): SJR 3.18 SNIP 3.256
Scopus rating (2008): SJR 2.537 SNIP 2.473
Scopus rating (2007): SJR 1.711 SNIP 2.124
Scopus rating (2006): SJR 1.55 SNIP 2.881
Scopus rating (2005): SJR 1.774 SNIP 3.07
Scopus rating (2004): SJR 0.852 SNIP 1.671
Scopus rating (2003): SJR 0.763 SNIP 1.489
Scopus rating (2002): SJR 1.658 SNIP 1.742
Scopus rating (2001): SJR 1.651 SNIP 1.714
Scopus rating (2000): SJR 0.934 SNIP 1.567
Scopus rating (1999): SJR 0.673 SNIP 1.076

Original language: English
Keywords: multijunction solar cells, molecular beam epitaxy, metal-organic chemical vapor deposition, dilute nitride semiconductors
DOIs: 10.1002/pip.2784

Bibliographical note
INT=orc,"Isoaho, Riku"
Research output: Scientific - peer-review › Article

Single-frequency 571nm VECSEL for photo-ionization of magnesium
We report the development of an intracavity-frequency-doubled vertical external-cavity surface-emitting laser (VECSEL) emitting at 571 nm for photoionization of magnesium. The laser employs a V-cavity geometry with a gain chip at the end of one cavity arm and a lithium triborate (LBO) crystal for second harmonic generation. The gain chip has a bottom-emitting design with ten GaInAs quantum wells of 7 nm thickness, which are strain compensated by GaAsP. The system is capable of producing up to 2.4 ± 0.1 W (total power in two separate output beams) in the visible. The free-running relative intensity noise was measured to be below −55 dBc/Hz over all frequencies from 1 Hz to 1 MHz. With acoustic isolation and temperature regulation of the laser breadboard, the mode-hop free operation time is typically over 5 hrs. To improve the long-term frequency stability, the laser can be locked to a Doppler-free transition of molecular iodine. To estimate the short-term linewidth, the laser was tuned to the resonance of a reference cavity. From analysis of the on-resonance Hänsch-Couillaud error signal we infer a linewidth of 50 ± 10 kHz. Light at 285 nm is generated with an external build-up cavity containing a β-barium borate (BBO) crystal. The UV light is used for loading 25Mg+ ions in a surface-electrode RF Paul trap. These results demonstrate the applicability and versatility of high-power, single-frequency VECSELs with intracavity harmonic generation for applications in atomic and molecular physics.

General information
State: Published
Enhancement of second-harmonic generation from metasurfaces through surface lattice resonances

General information
State: Published
Organisations: Department of Physics, Research area: Optics, Research group: Nonlinear Optics
Authors: Czaplicki, R., Kiviniemi, A., Laukkanen, J., Lehtolahti, J., Kuittinen, M., Kauranen, M.
Publication date: Apr 2016
Peer-reviewed: Unknown

Bibliographical note
INT=fys,"Kiviniemi, Antti"
Research output: Professional › Paper, poster or abstract

Finite temperature path-integral modeling of quantum dot cellular automata

General information
State: Published
Organisations: Department of Physics, Research group: Semiconductor Technology and Applications, Optoelectronics Research Centre, Research area: Computational Physics, Research group: Electronic Structure Theory
Authors: Tiihonen, J., Schramm, A., Kylänpää, I., Rantala, T.
Publication date: 29 Mar 2016
Peer-reviewed: Unknown
Event: Paper presented at PHYSICS DAYS / FYSIIKAN PÄIVÄT : ANNUAL MEETING OF THE FINNISH PHYSICAL SOCIETY.
Links:
Research output: Scientific › Paper, poster or abstract

Recognition of multipolar second-order nonlinearities in thin-film samples

We use two-beam second-harmonic generation to address thin films of silicon nitride (SiN). This technique is able to distinguish between the dipolar and higher-multipolar (magnetic and quadrupolar) contributions to the nonlinearity, as earlier shown for bulk samples. Our results for the SiN films exhibit strong multipolar signatures. Nevertheless, the results can be fully explained by the strong dipolar response of SiN once multiple reflections of the fundamental and second-harmonic fields within the film are properly taken into account. The results show that the recognition of multipolar nonlinearities requires extreme care for samples typically used for the characterization of new materials.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Optics, Research group: Nonlinear Optics, Department of Physics
Authors: Koskinen, K., Czaplicki, R., Kaplas, T., Kauranen, M.
Number of pages: 7
Pages: 4972-4978
Publication date: 1 Mar 2016
Peer-reviewed: Yes

Publication information
Journal: Optics Express
Volume: 24
Issue number: 5
ISSN (Print): 1094-4087
Ratings:
Scopus rating (2016): CiteScore 3.48 SJR 1.487 SNIP 1.589
Scopus rating (2015): SJR 1.976 SNIP 1.755 CiteScore 3.78
Scopus rating (2014): SJR 2.349 SNIP 2.166 CiteScore 4.18
Scopus rating (2013): SJR 2.358 SNIP 2.226 CiteScore 4.38
Scopus rating (2012): SJR 2.587 SNIP 2.145 CiteScore 3.85
Scopus rating (2011): SJR 2.579 SNIP 2.606 CiteScore 4.04
Scopus rating (2010): SJR 2.943 SNIP 2.466
Path integral simulation of eigenstates and dynamics of electrons

General information
State: Published
Organisations: Department of Physics, Research group: Electronic Structure Theory, Research area: Computational Physics
Authors: Ruokosenmäki, I. S., Gholizadehkalkhoran, H., Kylänpää, I. T., Rantala, T. T.
Number of pages: 1
Publication date: Mar 2016
Peer-reviewed: Unknown
Event: Paper presented at Physics days 2016, Oulu, Finland.
Research output: Scientific › Paper, poster or abstract

Numerical and Experimental Study on Inertial Impactors
One of the most important physical properties that defines the behavior of an aerosol particle is its size. Size defines to a great extent how particles behave in physical and chemical processes. Applying experimental and numerical methods, this thesis studies the fundamentals of the operation of impactors, the instruments that are used to measure the size of aerosol particles.

The first part of the thesis develops a CFD simulation approach, which is suitable for low pressure impactors and their verification. The CFD model is then used to the study parameters that affect the shape of a low pressure impactor’s collection efficiency curve. The second part focuses on the applications of these findings by introducing two new impactors: a variable nozzle area impactor (VNAI), designed for detailed study of particle behavior in collisions, and a high-resolution low-pressure cascade impactor (HRLPI), used in combination with electrical detection to measure nanoparticle size distribution.

Simulations showed that the steepness of the collection efficiency curve depends on the uniformity of the impaction conditions in the impactor jet. Conditions were defined in terms of static pressure, velocity, and particle stopping distance profiles in the cross section of the jet. Uniform impaction conditions and a steep cut-curve were achieved at a short throat, low pressure impactor stage.

In the devised VNAI impactor, particles showed very uniform impaction velocities, a fact that was used to examine the critical velocity of the rebound of spherical silver particles. The critical velocities were several orders of magnitude lower than those for micron sized particles. This may be explained by a different material pair used in the experiments and previous studies. The HRLPI was designed based on instrument response simulations to gain maximum information on aerodynamic size distribution and to guarantee robust inversion characteristics in real-time measurement. This was achieved with roughly ten stages per size decade and with slit type, short-throat nozzles.

This thesis sheds light on some still unanswered questions in impactor theory and successfully applies the theory to practise by introducing new high resolution impactors for nanoparticle research.
Site-controlled InAs quantum dot chains coupled to surface plasmons

Plasmonic hybrid nanostructures are material combinations where the plasmonic metal structure enables optical field confinement, while the other ingredients provide additional functionality, such as emission, absorption or optical nonlinearity. In particular, epitaxial InAs quantum dots (QD) embedded in a single-crystal GaAs matrix are highly efficient quantum emitters that can be integrated as plasmonic-semiconductor hybrids to realize various on-chip functions. In this letter, we demonstrate QD-plasmon coupling in a hybrid structure consisting of site-controlled InAs/GaAs quantum dot chains (QDC) in the proximity of an Ag film. The optical properties of the QDC-plasmon system are investigated using a cleaved-edge photoluminescence (PL) geometry, which allows us to probe the vertical and horizontal polarizations of the PL emission. We demonstrate plasmonic enhancement of both PL decay rate and vertical polarization of the PL emission with decreasing separation of the QDCs and the Ag film. The ability to couple site-controlled InAs QDCs with surface plasmons is a significant step towards exploitation of high quality epitaxial quantum dots as gain or loss compensation in subwavelength plasmonic metal structures, such as waveguide networks, quantum plasmonic structures, and metamaterials.
Optical amplifiers and lasers based on tapered fiber geometry for power and energy scaling with low signal distortion
We report theoretical and experimental study of tapered double-clad fibers (T-DCF) to be implemented as a gain media in a fiber lasers and amplifiers. We have considered most important properties and features of T-DCF. Various amplifiers and lasers using ytterbium T-DCF are demonstrated.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Research group: Ultrafast and intense lasers, Institute of Radio Engineering and Electronics, Russian Academy of Sciences (IRE RAS)
Authors: Filippov, V., Chamorovskii, Y. K., Golant, K. M., Vorotynskii, A., Okhotnikov, O. G.
Number of pages: 11
Publication date: Feb 2016

Host publication information
Volume: 9728
Publisher: SPIE
Editor: Ballato, J.
Article number: 97280V-1

Publication series
Name: SPIE conference proceedings
Publisher: SPIE
ISSN (Print): 0277-786X
ISSN (Electronic): 1996-756X
DOIs:
10.1117/12.2218051

Bibliographical note
JUFOID=71479
Research output: Scientific - peer-review › Conference contribution

Exact modeling of finite temperature and quantum delocalization effects on reliability of quantum-dot cellular automata
A thorough simulation study is carried out on thermal and quantum delocalization effects on the feasibility of a quantum-dot cellular automata (QCA) cell. The occupation correlation of two electrons is modeled with a simple four-site array of harmonic quantum dots (QD). QD sizes range from 20 nm to 40 nm with site separations from 20 nm to 100 nm, relevant for state-of-the-art GaAs/InAs semiconductor technology. The choice of parameters introduces QD overlap, which is only simulated properly with exact treatment of strong Coulombic correlation and thermal equilibrium quantum statistics. These are taken into account with path integral Monte Carlo approach. Thus, we demonstrate novel joint effects of quantum delocalization and decoherence in QCA, but also highly sophisticated quantitative evidence supporting the traditional relations in pragmatic QCA design. Moreover, we show the effects of dimensionality and spin state, and point out the parameter space conditions, where the 'classical' treatment becomes invalid.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research group: Semiconductor Technology and Applications, Optoelectronics Research Centre, Research area: Computational Physics, Research group: Electronic Structure Theory
Authors: Tiihonen, J., Schramm, A., Kylänpää, I., Rantalai, T. T.
Publication date: 11 Jan 2016
Peer-reviewed: Yes

Publication information
Volume: 49
Issue number: 6
Article number: 065103
ISSN (Print): 0022-3727
Ratings:
Scopus rating (2016): CiteScore 2.07 SJR 0.645 SNIP 0.917
Scopus rating (2015): SJR 0.693 SNIP 1.046 CiteScore 2.1
A 1.5-W frequency doubled semiconductor disk laser tunable over 40 nm at around 745 nm

1.5 W of output power was obtained in the challenging wavelength range between 700 and 800 nm by frequency doubling a wafer-fused 1.49-μm semiconductor disk laser pumped with 980-nm diodes. A bismuth borate crystal was used for doubling the frequency. A total optical-to-optical efficiency of 8.3 % was achieved. The laser was tunable from 720 to 764 nm with an intracavity birefringent plate. The beam quality parameter M2 remained below 1.5 at all power levels. The laser is attractive for biomedical applications such as photodynamic therapy that benefit from the low absorption of light in tissue in this spectral range.

Cholesterol oxidation products and their biological importance

The main biological cause of oxysterols is the oxidation of cholesterol. They differ from cholesterol by the presence of additional polar groups that are typically hydroxyl, keto, hydroperoxy, epoxy, or carboxyl moieties. Under typical
conditions, oxysterol concentration is maintained at a very low and precisely regulated level, with an excess of cholesterol. Like cholesterol, many oxysterols are hydrophobic and hence confined to cell membranes. However, small chemical differences between the sterols can significantly affect how they interact with other membrane components, and this in turn can have a substantial effect on membrane properties. In this spirit, this review describes the biological importance and the roles of oxysterols in the human body. We focus primarily on the effect of oxysterols on lipid membranes, but we also consider other issues such as enzymatic and nonenzymatic synthesis processes of oxysterols as well as pathological conditions induced by oxysterols.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research area: Computational Physics, Research group: Biological Physics and Soft Matter, J. Heyrovský Institute of Physical Chemistry, Academy of Sciences of the Czech Republic
Authors: Kulig, W., Cwiklik, L., Jurkiewicz, P., Rog, T., Vattulainen, I.
Number of pages: 17
Pages: 144-160
Publication date: 2016
Peer-reviewed: Yes

Publication information
Journal: Chemistry and Physics of Lipids
Volume: 199
ISSN (Print): 0009-3084
Ratings:
Scopus rating (2016): CiteScore 2.78 SJR 0.976 SNIP 0.862
Scopus rating (2015): SJR 0.957 SNIP 0.957 CiteScore 2.75
Scopus rating (2014): SJR 0.885 SNIP 1.039 CiteScore 2.62
Scopus rating (2013): SJR 0.82 SNIP 1.055 CiteScore 2.66
Scopus rating (2012): SJR 0.803 SNIP 0.974 CiteScore 2.41
Scopus rating (2011): SJR 0.727 SNIP 0.984 CiteScore 2.56
Scopus rating (2010): SJR 0.874 SNIP 0.964
Scopus rating (2009): SJR 0.9 SNIP 0.995
Scopus rating (2008): SJR 1.114 SNIP 1.057
Scopus rating (2007): SJR 1.083 SNIP 1.091
Scopus rating (2006): SJR 0.808 SNIP 0.881
Scopus rating (2005): SJR 1.038 SNIP 1.035
Scopus rating (2004): SJR 0.69 SNIP 0.831
Scopus rating (2003): SJR 0.917 SNIP 0.817
Scopus rating (2002): SJR 1.005 SNIP 0.813
Scopus rating (2001): SJR 1.097 SNIP 0.827
Scopus rating (2000): SJR 0.738 SNIP 0.742
Scopus rating (1999): SJR 0.737 SNIP 0.705
Original language: English
Keywords: Biological membranes, Biophysical properties, Cholesterol, Oxidation, Oxidative stress, Oxysterols, Reactive oxygen species
ASJC Scopus subject areas: Biochemistry, Molecular Biology, Organic Chemistry, Cell Biology
DOIs:
10.1016/j.chemphyslip.2016.03.001
Source: Scopus
Source-ID: 84959894259
Research output: Scientific - peer-review › Article

Dilute Nitride Four-Junction Solar Cell

General information
State: Published
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Optoelectronics Research Centre, Tampere University of Technology
Publication date: 2016
Peer-reviewed: Unknown
Exercise loading history and femoral neck strength in a sideways fall: A three-dimensional finite element modeling study.

Over 90% of hip fractures are caused by falls. Due to a fall-induced impact on the greater trochanter, the posterior part of the thin superolateral cortex of the femoral neck is known to experience the highest stress, making it a fracture-prone region. Cortical geometry of the proximal femur, in turn, reflects a mechanically appropriate form with respect to habitual exercise loading. In this finite element (FE) modeling study, we investigated whether specific exercise loading history is associated with femoral neck structural strength and estimated fall-induced stresses along the femoral neck. One hundred and eleven three-dimensional (3D) proximal femur FE models for a sideways falling situation were constructed from magnetic resonance (MR) images of 91 female athletes (aged 24.7±6.1years, >8years competitive career) and 20 non-competitive habitually active women (aged 23.7±3.8years) that served as a control group. The athletes were divided into five distinct groups based on the typical loading pattern of their sports: high-impact (H-I: triple-jumpers and high-jumpers), odd-impact (O-I: soccer and squash players), high-magnitude (H-M: power-lifters), repetitive-impact (R-I: endurance runners), and repetitive non-impact (R-NI: swimmers). The von Mises stresses obtained from the FE models were used to estimate mean fall-induced stresses in eight anatomical octants of the cortical bone cross-sections at the proximal, middle, and distal sites along the femoral neck axis. Significantly (p<0.05) lower stresses compared to the control group were observed: the H-I group - in the superoposterior (10%) and posterior (19%) octants at the middle site, and in the superoposterior (13%) and posterior (12%) octants at the distal site; the O-I group - in the superior (16%), superoposterior (16%), and posterior (12%) octants at the middle site, and in the superoposterior (14%) octant at the distal site; the H-M group - in the superior (13%) and superoposterior (15%) octants at the middle site, and a trend (p=0.07, 9%) in the superoposterior octant at the distal site; the R-I group - in the superior (14%), superoposterior (23%) and posterior (22%) octants at the middle site, and in the superoposterior (19%) and posterior (20%) octants at the distal site. The R-NI group did not differ significantly from the control group. These results suggest that exercise loading history comprising various impacts in particular is associated with a stronger femoral neck in a falling situation and may have potential to reduce hip fragility.
Fabrication and Second-harmonic Generation Imaging of Oriented Ion-shaped Nanoparticles

General information
State: Published
Organisations: Department of Physics, Research group: Nonlinear Optics, Research area: Optics, Optoelectronics Research Centre
Authors: Slablab, A., Turquet, L., Isotalo, T. J., COULON, P., Niemi, K. T., Kociak, M., Rizza, G., Kauranen, M. O.
Publication date: 2016
Peer-reviewed: Unknown
Research output: Scientific > Paper, poster or abstract

High efficiency dilute nitride solar cells: Simulations meet experiments

Parameter extraction procedure and simulation of dilute nitride solar cells are reported. Using PC1D simulation and fitting to experimental current-voltage and external quantum efficiency data, we retrieve the phenomenological material parameters for GaInNAs solar cells. Based on these, we have constructed a model that can explain the changes in short circuit current and open circuit voltage of n-i-p solar cells subjected to rapid thermal annealing. The model reveals that non-annealed MBE-grown GaInNAs material has an n-type doping that evolves to p-type upon rapid thermal annealing. The change of doping type and the shift of the physical location of the pn-junction were confirmed by Kelvin-probe force microscopy. The PC1D modelling was found to work well also for GaInNAs p-i-n solar cells with opposite polarity. It was also found that the GaInNAs lower doping levels in p-i-n solar cells grown at lowered As/III flux ratios were associated with increased carrier lifetimes.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications
High-efficiency III-V solar cells: From drawing board to real devices

The record solar cell conversion efficiency of 46% at concentrated sunlight has been demonstrated by direct bonding technique [1]. Regardless of the high efficiencies obtained using the direct wafer bonding technique, the conventional monolithic approach used in commercial solar cell production has several benefits, including production technology and cost-related factors. And yet, there is a high unused potential, particularly in new materials that can be grown lattice-matched onto GaAs or Ge substrates. For example, by utilizing dilute nitride materials in multijunction solar cell structures with more than three junctions and by carefully optimizing structural elements and manufacturing technology, efficiencies exceeding 50% is a realistic target [2]. Here we review our theoretical and experimental work carried out on development of various parts of high-efficiency multijunction solar cells based on GaInNAsSb-based materials, i.e., dilute nitrides. First of all, we have developed a molecular beam epitaxy process for GaInNAsSb sub-junction with very high external quantum efficiency exceeding 90%. This building block is essential for achieving high conversion efficiency for GaInP/GaAs/GaInNAsSb triple-junction solar cells. Secondly, the use of a variety of electro-optical simulation tools such as Crosslight APSYS, Silvaco TCAD, PC1D, Es-sential MacLeod and semi-empirical analytical models combined with experimental work on numerous test samples have helped in fabricating ultra-low specific resistivity tunnel junctions and high-quality sub-junctions based on conventional III-V materials such as GaInP and GaAs to be integrated with the dilute nitride sub-junction. Thirdly, we have also extracted important material specific physical parameters such as carrier lifetimes, mobilities and concentrations for dilute nitrides by matching the simulations to experimental solar cell device characteristics [3]. The extracted parameters are used for refining the simulation models which provide deeper understanding of the device physics. The work done so far has led to a rapid increase in conversion efficiency of our GaInP/GaAs/GaInNAsSb triple-junction solar cells at a pace of ~5 % points/year since 2012. High-efficiency solar cells with efficiencies of 29% and 31% at one sun (AM0 and AM1.5G, respectively) and 36–39% under concentrated sunlight (at ~70 suns) have already been demonstrated [4,5]. Additionally, the effects of various optical and structural design elements related to fabrication of real III-V multijunction solar cells will be critically reviewed. Especially, we will concentrate on the pros and cons of backside reflector structure architectures – including various planar reflector types and Lambertian scatterers – and nanostructured antireflection coatings [6] which are currently widely employed for solar cell photon management. The consequences of adding such elements to the fabrication process and impact on improving the conversion efficiency towards >50% efficiency are assessed.

General Information

State: Published
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications
Authors: Tukiainen, A., Aho, A., Polojarvi, V., Ahorinta, R., Guina, M.
Publication date: 2016
Peer-reviewed: Unknown
Event: Paper presented at Optics and Photonics days, Tampere, Finland.
Hydrophobisation of wood surfaces by combining liquid flame spray (LFS) and plasma treatment: Dynamic wetting properties

The hydrophilic nature of wood surfaces is a major cause for water uptake and subsequent biological degradation and dimensional changes. In the present paper, a thin transparent superhydrophobic layer on pine veneer surfaces has been created for controlling surface wettability and water repellency. This effect was achieved by means of the liquid flame spray (LFS) technique, in the course of which the nanoparticulate titanium dioxide (TiO2) was brought to the surface, followed by plasma polymerisation. Plasma polymerised perfluorohexane (PFH)

Increasing the quantum efficiency of GaInNAs solar cells by advanced optical design

Increasing the quantum efficiency of GaInNAs solar cells by advanced optical design
Influence of age-precipitation of Nb-Ti stabilized FeCr alloy on the initial stages of oxide film formation at 650 °C

**General information**
State: Published
Ministry of Education publication type: D4 Published development or research report or study
Organisations: Optoelectronics Research Centre, Research group: Surface Science, MAX IV Laboratory, Lund University
Authors: Ali-Löytty, H., Hannula, M., Niu, Y., Zakharov, A., Valden, M.
Publication date: 2016

**Publication information**
Publisher: Lund University, MAX IV Laboratory
Original language: English
Links:
https://www.maxlab.lu.se/cmis/display?id=workspace%3A%2F%2FSpacesStore%2Fbd7dec7f-b5c5-478a-af1e-8fbe1d875fe7
Links:
https://www.maxlab.lu.se/node/2032#I311-PEEM_
Research output: Professional › Commissioned report

Interdigitation of long-chain sphingomyelin induces coupling of membrane leaflets in a cholesterol dependent manner
It has been a long-standing question how the two leaflets in a lipid bilayer modulate each others’ physical properties. In this paper, we discuss how this interaction may take place through interdigitation. We use atomistic molecular dynamics simulations to consider asymmetric lipid membrane models whose compositions are based on the lipidomics data determined for exosomes released by PC-3 prostate cancer cells. The simulations show interdigitation to be exceptionally strong for long-chain sphingomyelin (SM) molecules. In asymmetric membranes the amide-linked chain of SM is observed to extend deep into the opposing membrane leaflet. Interestingly, we find that the conformational order of the amide-linked SM chain increases the deeper it penetrates to the opposing leaflet. Analysis of this finding reveals that the amide-linked SM chain interacts favorably with the lipid chains in the opposite leaflet, and that cholesterol modulates the effect of SM interdigitation by influencing the conformational order of lipid hydrocarbon chains in the opposing (cytosolic) leaflet.

**General information**
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research area: Computational Physics, Research group: Biological Physics and Soft Matter, University of Limerick
Authors: Rog, T., Orlowski, A., Llorente, A., Skotland, T., Sylvänne, T., Kauhanen, D., Ekroos, K., Sandvig, K., Vattulainen, I.
Pages: 281-288
Publication date: 2016
Peer-reviewed: Yes

**Publication information**
Journal: Biochimica et Biophysica Acta: Biomembranes
Volume: 1858
Issue number: 2
ISSN (Print): 0005-2736
Ratings:
Scopus rating (2016): CiteScore 3.55 SJR 1.511 SNIP 1.101
Scopus rating (2015): SJR 1.782 SNIP 1.142 CiteScore 3.8
Scopus rating (2014): SJR 1.869 SNIP 1.09 CiteScore 3.64
Scopus rating (2013): SJR 1.592 SNIP 0.975 CiteScore 3.45
Scopus rating (2012): SJR 1.833 SNIP 1.156 CiteScore 3.99
Scopus rating (2011): SJR 1.644 SNIP 1.227 CiteScore 4.17
Scopus rating (2010): SJR 2.179 SNIP 1.291
Scopus rating (2009): SJR 2.152 SNIP 1.298
Scopus rating (2008): SJR 2.035 SNIP 1.123
Lasitetun parvekkeen ääneneristys liikennemelua vastaan

General information
State: Published
Ministry of Education publication type: D1 Article in a trade journal
Organisations: Department of Civil Engineering, Research group: Building Acoustics, A-Insinöörit Suunnittelu Oy
Authors: Kovalainen, V., Kylliäinen, M.
Number of pages: 10
Pages: 4-13
Publication date: 2016
Peer-reviewed: Unknown

Publication information
Journal: Lasirakentaja
Issue number: 2
ISSN (Print): 0788-8147
Original language: English
Keywords: sound insulation, noise control, traffic noise, glazed spaces
ASJC Scopus subject areas: Acoustics and Ultrasonics
Research output: Professional › Article

Microwave assisted laser-induced breakdown spectroscopy in ambient conditions

General information
State: Published
Organisations: Department of Physics, Research area: Optics, Research group: Applied Optics
Authors: Viljanen, J. O.
Publication date: 2016
Peer-reviewed: Unknown
Event: Paper presented at 9th International Conference on Laser-Induced Breakdown Spectroscopy (LIBS), Chamonix, France.
Research output: Scientific › Paper, poster or abstract

Optimizing iron alloy catalyst materials for photoelectrochemical water splitting: Passivation of FeCr alloy surface by water vapour using near-ambient-pressure photoelectron spectroscopy

General information
State: Published
Ministry of Education publication type: D4 Published development or research report or study
Organisations: Optoelectronics Research Centre, Research group: Surface Science, MAX IV Laboratory, Lund University
Authors: Lahtonen, K., Hannula, M., Ali-Löytty, H., Hirsimäki, M., Urpelainen, S., Valden, M.
Number of pages: 2
Publication date: 2016

Publication information
Place of publication: Lund, Sweden
Publisher: Lund University, MAX IV Laboratory
Original language: English
Photoluminescence properties of novel GaAsBi compounds fabricated by molecular beam epitaxy

General information
State: Published
Organisations: Photonics, Research group: ORC
Authors: Hilska, J., Puustinen, J., Guina, M.
Publication date: 2016
Peer-reviewed: Unknown
Event: Paper presented at Optics and Photonics days, Tampere, Finland.
Keywords: molecular beam epitaxy, GaAsBi, Photoluminescence
Research output: Scientific › Paper, poster or abstract

Plasmonic and photonic resonances in nonlinear optics of metasurfaces

General information
State: Published
Organisations: Department of Physics, Research area: Optics, Research group: Nonlinear Optics, Univ Eastern Finland, University of Eastern Finland, Inst Photon
Authors: Kauranen, M., Czaplicki, R., Mäkitalo, J., Kiviniemi, A., Lehtolahti, J., Laukkanen, J., Kuitinen, M.
Publication date: 2016
Peer-reviewed: Unknown
Research output: Professional › Paper, poster or abstract

Role of charged lipids in membrane structures: Insight given by simulations

Lipids and proteins are the main components of cell membranes. It is becoming increasingly clear that lipids, in addition to providing an environment for proteins to work in, are in many cases also able to modulate the structure and function of those proteins. Particularly charged lipids such as phosphatidylinositolos and phosphatidylserines are involved in several examples of such effects. Molecular dynamics simulations have proved an invaluable tool in exploring these aspects. This so-called computational microscope can provide both complementing explanations for the experimental results and guide experiments to fruitful directions. In this paper, we review studies that have utilized molecular dynamics simulations to unravel the roles of charged lipids in membrane structures. We focus on lipids as active constituents of the membranes, affecting both general membrane properties as well as non-lipid membrane components, mainly proteins. This article is part of a Special Issue entitled: Biosimulations edited by Ilpo Vattulainen and Tomasz Róg.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research area: Computational Physics, Research group: Biological Physics and Soft Matter, University of Helsinki, University of Southern Denmark
Authors: Pöyry, S., Vattulainen, I.
Number of pages: 12
Pages: 2322–2333
Publication date: 2016
Peer-reviewed: Yes

Publication information
Journal: Biochimica et Biophysica Acta: Biomembranes
ISSN (Print): 0005-2736
Ratings:
Scopus rating (2016): CiteScore 3.55 SJR 1.511 SNIP 1.101
Scopus rating (2015): SJR 1.782 SNIP 1.142 CiteScore 3.8
Scopus rating (2014): SJR 1.869 SNIP 1.09 CiteScore 3.64
Site-controlled InAs Quantum Dots Coupled to Surface Plasmons

General information
State: Published
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Department of Electronics and Communications Engineering, Research group: Laboratory for Future Electronics, Research group: Nanophotonics
Authors: Hakkarainen, T. V., Tommila, J. T., Schramm, A., Simonen, J. P. J., Niemi, K. T., Strelow, C., Kipp, T., Kontio, J. M., Guina, M.
Publication date: 2016
Peer-reviewed: Unknown
Research output: Scientific › Paper, poster or abstract

Site-controlled InAs Quantum Dots for Plasmonics
We present site-controlled epitaxy of InAs quantum dots (QD) for plasmonics and report QD-plasmon coupling in a hybrid structure consisting of site-controlled InAs/GaAs QD chains in the proximity of an Ag film.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Research group: Laboratory for Future Electronics, Department of Physics, Research group: Nanophotonics
Authors: Hakkarainen, T., Tommila, J., Schramm, A., Simonen, J., Niemi, T., Strelow, C., Kipp, T., Kontio, J., Guina, M.
Publication date: 2016

Host publication information
Title of host publication: Conference on Lasers and Electro-Optics 2016 : QELS_Fundamental Science
Publisher: OSA - The Optical Society
Article number: FM1B.3
ASJC Scopus subject areas: Condensed Matter Physics, Electronic, Optical and Magnetic Materials
Keywords: (250.5403) Plasmonics, (160.4236) Nanomaterials, (160.6000) Semiconductor materials
DOIs:
Temporal Ghost Imaging with Magnification

General information
State: Published
Organisations: Department of Physics, Research area: Optics, Research group: Nonlinear Fiber Optics
Authors: Ryczkowski, P., Barbier, M., Friberg, A. T., Dudley, J. M., Genty, G.
Publication date: 2016
Peer-reviewed: Unknown
Event: Paper presented at Optics and Photonics days, Tampere, Finland.
Research output: Scientific › Paper, poster or abstract

The biophysical properties of ethanolamine plasmalogens revealed by atomistic molecular dynamics simulations
Given the importance of plasmalogens in cellular membranes and neurodegenerative diseases, a better understanding of how plasmalogens affect the lipid membrane properties is needed. Here we carried out molecular dynamics simulations to study a lipid membrane comprised of ethanolamine plasmalogens (PE-plasmalogens). We compared the results to the PE-diacyl counterpart and palmitoyl-oleyl-phosphatidylcholine (POPC) bilayers. Results show that PE-plasmalogens form more compressed, thicker, and rigid lipid bilayers in comparison with the PE-diacyl and POPC membranes. The results also point out that the vinyl-ether linkage increases the ordering of sn-1 chain substantially and the ordering of the sn-2 chain to a minor extent. Further, the vinyl-ether linkage changes the orientation of the lipid head group, but it does not cause changes in the head group and glycerol backbone tilt angles with respect to the bilayer normal. The vinyl-ether linkage also packs the proximal regions of the sn-1 and sn-2 chains more closely together which also decreases the distance between the rest of the sn-1 and sn-2 chains.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research area: Computational Physics, Tampere University of Technology, VTT Technical Research Centre of Finland
Authors: Rog, T., Koivuniemi, A.
Number of pages: 7
Pages: 97-103
Publication date: 2016
Peer-reviewed: Yes
Early online date: 1 Jan 2015
Publication information
Journal: Biochimica et Biophysica Acta: Biomembranes
Volume: 1858
Issue number: 1
ISSN (Print): 0005-2736
Ratings:
Scopus rating (2016): CiteScore 3.55 SJR 1.511 SNIP 1.101
Scopus rating (2015): SJR 1.782 SNIP 1.142 CiteScore 3.8
Scopus rating (2014): SJR 1.869 SNIP 1.09 CiteScore 3.64
Scopus rating (2013): SJR 1.592 SNIP 0.975 CiteScore 3.45
Scopus rating (2012): SJR 1.833 SNIP 1.156 CiteScore 3.99
Scopus rating (2011): SJR 1.644 SNIP 1.227 CiteScore 4.17
Scopus rating (2010): SJR 2.179 SNIP 1.291
Scopus rating (2009): SJR 2.152 SNIP 1.298
Scopus rating (2008): SJR 2.035 SNIP 1.123
Scopus rating (2007): SJR 2.021 SNIP 1.158
Scopus rating (2006): SJR 1.922 SNIP 1.212
Scopus rating (2005): SJR 2.037 SNIP 1.231
Scopus rating (2004): SJR 1.5 SNIP 1.147
Scopus rating (2003): SJR 1.401 SNIP 1.115
Scopus rating (2002): SJR 1.594 SNIP 1.228
Scopus rating (2001): SJR 1.509 SNIP 1.053
Thermal desorption of molecular oxygen from SnO$_2$ (110) surface: Insights from first-principles calculations
First-principles density functional theory calculations in the generalized gradient approximation, with plane wave basis set and pseudopotentials, have been used to investigate the desorption pathways of molecular oxygen species adsorbed on the SnO$_2$ (110) surface. Energetics of the thermodynamically favored precursors is studied in dependence on the surface charge provided either by surface defects or by donor type impurities from the near-surface region. The resonant desorption modes of O$_2$ molecules are examined in the framework of ab initio atomic thermodynamics and relationship of these results to experiential observations is discussed.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research area: Computational Physics, Research group: Electronic Structure Theory, South-Ukrainian University
Authors: Golovanov, V., Golovanova, V., Rantala, T. T.
Number of pages: 8
Pages: 15-22
Publication date: 2016
Peer-reviewed: Yes

Publication information
Journal: Journal of Physics and Chemistry of Solids
Volume: 89
ISSN (Print): 0022-3697
Ratings:
Scopus rating (2016): CiteScore 1.94 SJR 0.605 SNIP 0.943
Scopus rating (2015): SJR 0.623 SNIP 1.007 CiteScore 2.01
Scopus rating (2014): SJR 0.659 SNIP 1.042 CiteScore 1.83
Scopus rating (2013): SJR 0.672 SNIP 1.125 CiteScore 1.86
Scopus rating (2012): SJR 0.728 SNIP 1.102 CiteScore 1.74
Scopus rating (2011): SJR 0.669 SNIP 1.002 CiteScore 1.59
Scopus rating (2010): SJR 0.728 SNIP 0.879
Scopus rating (2009): SJR 0.679 SNIP 0.742
Scopus rating (2008): SJR 0.624 SNIP 0.807
Scopus rating (2007): SJR 0.667 SNIP 0.787
Scopus rating (2006): SJR 0.673 SNIP 0.946
Scopus rating (2005): SJR 0.746 SNIP 0.948
Scopus rating (2004): SJR 0.705 SNIP 0.811
Scopus rating (2003): SJR 0.78 SNIP 0.905
Scopus rating (2002): SJR 0.749 SNIP 0.903
Scopus rating (2001): SJR 0.851 SNIP 0.724
Scopus rating (2000): SJR 0.9 SNIP 0.741
Scopus rating (1999): SJR 0.825 SNIP 0.798
Original language: English
ASJC Scopus subject areas: Condensed Matter Physics, Chemistry(all), Materials Science(all)
Keywords: A. oxides, B. ab initio calculations, C. surface properties
DOIs:
10.1016/j.jpcs.2015.10.010
Source: Scopus
Source-ID: 84945973267
**Transformation of ALD grown TiO2 film to topographically microstructured titanium silicide for photonics applications**

**General information**
State: Published
Ministry of Education publication type: D4 Published development or research report or study
Organisations: Optoelectronics Research Centre, Research group: Surface Science, Research group: Nanophotonics
Number of pages: 2
Publication date: 2016

**Publication information**
Place of publication: Lund
Publisher: Lund University, MAX IV Laboratory
Original language: English
Keywords: titanium silicide, Synchrotron, photoemission electron microscopy
Links: https://www.maxlab.lu.se/cmis/display?id=workspace%3A%2F%2FSpacesStore%2F80e2da54-8373-4d0c-a4af-8b53b81b0ca3
Links: https://www.maxlab.lu.se/node/2032#I311-PEEM_ (Reports 2015 - Syncrotron Radiation)

**Voltage-driven beam bistability in a reorientational uniaxial dielectric**
We report on voltage controlled bistability of optical beams propagating in a nonlinear reorientational uniaxial dielectric, namely, nematic liquid crystals. In the nonlinear regime where spatial solitons can be generated, two stable states are accessible to a beam of given power in a finite interval of applied voltages, one state corresponding to linear diffraction and the other to self-confinement. We observe such a first-order transition and the associated hysteresis in a configuration when both the beam and the voltage reorientate the molecules beyond a threshold.

**General information**
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research group: Nonlinear Optics, Research area: Optics
Authors: Piccardi, A., Kravets, N., Alberucci, A., Buchnev, O., Assanto, G.
Publication date: 2016
Peer-reviewed: Yes

**Publication information**
Journal: APL Photonics
Volume: 1
Article number: 011302
ISSN (Print): 2378-0967
Original language: English
Links: http://scitation.aip.org/content/aip/journal/app/1/1/10.1063/1.4945349

**Bibliographical note**
INT=orc,"Assanto, Gaetano"

**Research output: Scientific - peer-review › Article**

**What can we learn about cholesterol’s transmembrane distribution based on cholesterol-induced changes in membrane potential?**
Cholesterol is abundant in the plasma membranes of animal cells and is known to regulate a variety of membrane properties. Despite decades of research, the transmembrane distribution of cholesterol is still a matter of debate. Here we consider this outstanding issue through atomistic simulations of asymmetric lipid membranes, whose composition is largely consistent with eukaryotic plasma membranes. We show that the membrane dipole potential changes in a cholesterol-dependent manner. Remarkably, moving cholesterol from the extracellular to the cytosolic leaflet increases the dipole potential on the cytosolic side, and vice versa. Biologically this implies that by altering the dipole potential, cholesterol can provide a driving force for cholesterol molecules to favor the cytosolic leaflet, in order to compensate for the intramembrane field that arises from the resting potential.
**General information**

State: Published

Ministry of Education publication type: A1 Journal article-refereed

Organisations: Department of Physics, Research area: Computational Physics, Research group: Biological Physics and Soft Matter, Institute of Macromolecular Compounds, Russian Academy of Sciences, St. Petersburg, Institute of Organic Chemistry and Biochemistry, Czech Academy of Sciences, Flemingovo náměstí 542/2, 166 10 Praha 6, Czech Republic, Belozersky Institute of Physico-Chemical Biology, Lomonosov Moscow State University, Leninskie Gory, 1/40, 119991 Moscow, Russia

Authors: Falkovich, S. G., Martinez-Seara, H., Nesterenko, A. M., Vattulainen, I., Gurtovenko, A. A.

Number of pages: 6

Pages: 4585-4590

Publication date: 2016

Peer-reviewed: Yes

**Publication information**

Journal: Journal of Physical Chemistry Letters

Volume: 7

Issue number: 22

ISSN (Print): 1948-7185

Ratings:

Scopus rating (2016): CiteScore 8.18 SJR 4.583 SNIP 1.68

Scopus rating (2015): SJR 4.233 SNIP 1.829 CiteScore 8.04

Scopus rating (2014): SJR 3.722 SNIP 1.724 CiteScore 7

Scopus rating (2013): SJR 3.515 SNIP 1.61 CiteScore 6.61

Scopus rating (2012): SJR 3.943 SNIP 1.751 CiteScore 6.3

Scopus rating (2011): SJR 3.244 SNIP 1.602 CiteScore 5.95

Original language: English

DOIs:

10.1021/acs.jpclett.6b02123

Research output: Scientific - peer-review › Article

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**General information**

State: Published

Organisations: Optoelectronics Research Centre, Research group: Surface Science

Authors: Ali-Löytty, H., Valden, M.

Number of pages: 1

Pages: 114

Publication date: 2016

Peer-reviewed: Unknown

Event: Paper presented at Physics days 2016, Oulu, Finland.

Research output: Scientific › Paper, poster or abstract

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**X-ray photoelectron spectroscopy of electrochemical interfaces for solar fuel production**

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**General information**

State: Published

Organisations: Optoelectronics Research Centre, Research group: Surface Science

Authors: Ali-Löytty, H., Valden, M.

Number of pages: 1

Pages: 114

Publication date: 2016

Peer-reviewed: Unknown

Event: Paper presented at Physics days 2016, Oulu, Finland.

Research output: Scientific › Paper, poster or abstract

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**SESAM mode-locked Tm:CALGO laser at 2 µm**

GaSb-based SESAM is successfully employed for passive mode locking of a Tm3+:CaGdAlO4 laser operating near 2 µm. The pulse duration is around 650 fs at a repetition rate ~100 MHz.

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**General information**

State: Published

Ministry of Education publication type: A1 Journal article-refereed

Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Max Born Institut, Berlin, Germany


Number of pages: 6

Pages: 131-136

Publication date: 14 Dec 2015

Peer-reviewed: Yes

**Publication information**

Journal: Optical Materials Express
Structure of amorphous Ag/Ge/S alloys: experimentally constrained density functional study
Density functional/molecular dynamics simulations have been performed to determine structural and other properties of amorphous Ag/Ge/S and Ge/S alloys. In the former, the calculations have been combined with experimental data (x-ray and neutron diffraction, extended x-ray absorption fine structure). Ag/Ge/As alloys have high ionic conductivity and are among the most promising candidates for future memristor technology. We find excellent agreement between the experimental results and large-scale (500 atoms) simulations in Ag/Ge/S, and we compare and contrast the structures of Ge/S and Ag/Ge/S. The calculated electronic structures, vibrational densities of states, ionic mobilities, and cavity distributions of the amorphous materials are discussed and compared with data on crystalline phases where available. The high mobility of Ag in solid state electrolyte applications is related to the presence of cavities and can occur via jumps to a neighbouring vacant site.
High-Power Dilute Nitride Lasers Grown by Molecular Beam Epitaxy

Semiconductor lasers are the most widely used type of lasers. This is due to many beneficial properties including compact size, wavelength coverage, and high efficiency. Different semiconductor laser architectures and gain materials can be used to fulfill requirements of different applications. Semiconductor gain materials are easy to tune to emit at desired wavelengths by changing the composition of the material and they can cover a wide range of wavelengths from ultra-violet to mid-infrared. Still, there are some important gaps in the wavelength coverage. Two of these gaps are located at ~600 nm and ~1200 nm, i.e. just below and above the wavelength coverage of traditional GaAs-based semiconductors. Especially the yellow–red (580–620 nm) part of the visible spectrum is important for applications in the fields of medicine, spectroscopy, astronomy and laser projection.

This work targeted to cover both of the mentioned wavelength gaps by using dilute nitride GaInNAsSb/GaAs quantum well gain material in novel high-power lasers. This thesis discusses especially the fabrication of the dilute nitride gain materials using plasma-assisted molecular beam epitaxy. Incorporating few percent of nitrogen into InGaAs/GaAs QWs can increase the upper wavelength limit of GaAs-based semiconductors up to 1550 nm by reducing band gap and lattice strain. Using this dilute nitride material system, we fabricated the first multi-watt semiconductor disk lasers (SDLs) emitting at 1180 nm and 1230 nm. The output powers exceeded 10 W at both wavelengths. Although frequency doubling is out of the scope of this thesis, it should be mentioned that these lasers emitted multi-watt powers also at the corresponding frequency doubled wavelengths of 590 nm and 615 nm. In addition, this thesis reports a GaInNAsSb/GaAs SDL emitting at 1550 nm, which is the longest wavelength demonstrated for a monolithic GaAs-based semiconductor.

SDLs, unlike other semiconductor lasers, can emit high-powers (up to 100 W) in nearly diffraction-limited beams and can be efficiently frequency doubled. However, not all applications require multi-watt output powers but would rather benefit from smaller size of the laser source. For this reason we studied also another laser architecture, namely edge-emitting laser diodes. A single-mode laser with record-high output power of 340 mW at 1180 nm, corresponding to yellow (590 nm) frequency-doubled wavelength, was demonstrated. The laser showed also excellent temperature stability, which is important for miniaturization of frequency-doubled lasers.

The laser demonstrations could not have been realized without good understanding of the basic properties of the GaInNAs(Sb) gain material and its fabrication. Studies related to these aspects and to calibration of PA-MBE reactors form an important part of this thesis. Especially, effects of growth temperature and As/III beam equivalent pressure ratio on the grown semiconductor structures were studied.

In summary, this work is concerned with plasma-assisted molecular beam epitaxy of GaInNAsSb/GaAs gain materials. The fabricated materials were used in novel lasers emitting at wide range of technologically important wavelengths that are difficult to reach otherwise.
Mutually Exclusive Roles of SHARPIN in Integrin Inactivation and NF-κB Signaling

SHANK-associated RH domain interactor (SHARPIN) inhibits integrins through interaction with the integrin α-subunit. In addition, SHARPIN enhances nuclear factor-kappaB (NF-κB) activity as a component of the linear ubiquitin chain assembly complex (LUBAC). However, it is currently unclear how regulation of these seemingly different roles is coordinated. Here, we show that SHARPIN binds integrin and LUBAC in a mutually exclusive manner. We map the integrin binding site on SHARPIN to the ubiquitin-like (UBL) domain, the same domain implicated in SHARPIN interaction with LUBAC component RNF31 (ring finger protein 31), and identify two SHARPIN residues (V267, L276) required for both integrin and RNF31 regulation. Accordingly, the integrin α-tail is capable of competing with RNF31 for SHARPIN binding in vitro. Importantly, the full SHARPIN RNF31-binding site contains residues (F263A/I272A) that are dispensable for SHARPIN-integrin interaction. Importantly, disrupting SHARPIN interaction with integrin or RNF31 abolishes SHARPIN-mediated regulation of integrin or NF-κB activity, respectively. Altogether these data suggest that the roles of SHARPIN in inhibiting integrin activity and supporting linear ubiquitination are (molecularly) distinct.

On the Synthesis, Morphology, and Applications of Engineered Aerosol Nanoparticles

Nanotechnology, the manipulation of matter at the scale of 1–100 nm, is present in everyday life and continues extending into new areas of application. Aerosol synthesis routes, the production of nanoparticles in the gas phase, are known to be continuous, highly controllable, and even suitable for fabricating different types of nanostructured metamaterials—materials with properties not found in nature. In this thesis, single and multicomponent engineered aerosol nanoparticles with different morphologies were synthesized for applications involving interactions between light and matter. The synthesized nanoparticles included spherical silver particles, titania-encapsulated iron oxide particles, silver-decorated silica particles, and silver–titania composite doublet particles. Furthermore, the studied applications for the nanoparticles were magnetically separable photocatalyst nanopowders and nanostructured metal–dielectric metamaterials with linear and nonlinear optical properties, more specifically, localized surface plasmon resonance and second-harmonic generation, respectively.
The aerosol synthesis techniques utilized for the nanoparticle production in this thesis included particle size selection, sintering, encapsulation, and coating. The sintering of the size-selected silver agglomerates to spheres continued the trends found from the literature. In the simple encapsulation process, liquid precursor containing solid particles was sprayed into a tubular furnace where the precursor thermally decomposed on the surface of the solid particles, forming multicomponent particles. This approach was demonstrated by synthesizing titania-encapsulated iron oxide particles. As titania and iron oxide are known to be photocatalytic and magnetic, respectively, the produced nanopowder could find use as a magnetically separable photocatalyst. The silver coatings on the silica and titania carrier particles, accomplished by physical vapor condensation, were found to form different types of morphologies due to the migration of the silver on the carrier particles.

The wavelength of the localized surface plasmon resonance of spherical silver particles deposited on glass substrates was tuned between 400–450 nm with the particle size. Due to the random deposition process, particle–particle contacts on the substrate caused broadening of the extinction spectrum with higher area fractions. On the other hand, the silver-decorated silica nanoparticles maintained the narrow plasmon resonance band even with high particle number densities. This enabled the fabrication of thicker bulk-type optical materials. The nonlinear optical properties of bulk-type multilayer nanostructures consisting of alternating layers of silver-decorated silica nanoparticles and pure silica were investigated. It was proposed that the porous particle layers were in a key role in the formation of the required non-centrosymmetric structure. Furthermore, both the silver particles and the multilayer structure were important for the second-harmonic generation, whose intensity increased with the number of layers. The fabricated structures could be further optimized in order to increase the conversion efficiency of the second-order nonlinear optical process.

Self-subdiffusion in solutions of star-shaped crowders: non-monotonic effects of inter-particle interactions
We examine by extensive computer simulations the self-diffusion of anisotropic star-like particles in crowded two-dimensional solutions. We investigate the implications of the area coverage fraction \( \phi \) of the crowders and the crowder-crowder adhesion properties on the regime of transient anomalous diffusion. We systematically compute the mean squared displacement (MSD) of the particles, their time averaged MSD, and the effective diffusion coefficient. The diffusion is ergodic in the limit of long traces, such that the mean time averaged MSD converges towards the ensemble averaged MSD, and features a small residual amplitude spread of the time averaged MSD from individual trajectories. At intermediate time scales, we quantify the anomalous diffusion in the system. Also, we show that the translational-but not rotational-diffusivity of the particles \( D(\phi) \) is a nonmonotonic function of the attraction strength between them. Both diffusion coefficients decrease as the power law \( D(\phi) \propto (1 - \phi/\phi^*)^{2 \ldots 2.4} \) with the area fraction \( \phi \) occupied by the crowders and the critical value \( \phi^* \). Our results might be applicable to rationalising the experimental observations of non-Brownian diffusion for a number of standard macromolecular crowders used in vitro to mimic the cytoplasmic conditions of living cells.

General information
State: Published
Ministry of Education publication type: G5 Doctoral dissertation (article)
Organisations: Department of Physics, Research area: Aerosol Physics
Authors: Harra, J.
Number of pages: 50
Publication date: 20 Nov 2015

Publication information
Publisher: Tampere University of Technology
Original language: English

Publication series
Name: Tampere University of Technology. Publication
Publisher: Tampere University of Technology
Volume: 1345
ISSN (Print): 1459-2045
Electronic versions:
harra_1345
Links:

Bibliographical note
Awarding institution:Tampere University of Technology
Research output: Collection of articles › Doctoral Thesis

Self-subdiffusion in solutions of star-shaped crowders: non-monotonic effects of inter-particle interactions
We examine by extensive computer simulations the self-diffusion of anisotropic star-like particles in crowded two-dimensional solutions. We investigate the implications of the area coverage fraction \( \phi \) of the crowders and the crowder-crowder adhesion properties on the regime of transient anomalous diffusion. We systematically compute the mean squared displacement (MSD) of the particles, their time averaged MSD, and the effective diffusion coefficient. The diffusion is ergodic in the limit of long traces, such that the mean time averaged MSD converges towards the ensemble averaged MSD, and features a small residual amplitude spread of the time averaged MSD from individual trajectories. At intermediate time scales, we quantify the anomalous diffusion in the system. Also, we show that the translational-but not rotational-diffusivity of the particles \( D(\phi) \) is a nonmonotonic function of the attraction strength between them. Both diffusion coefficients decrease as the power law \( D(\phi) \propto (1 - \phi/\phi^*)^{2 \ldots 2.4} \) with the area fraction \( \phi \) occupied by the crowders and the critical value \( \phi^* \). Our results might be applicable to rationalising the experimental observations of non-Brownian diffusion for a number of standard macromolecular crowders used in vitro to mimic the cytoplasmic conditions of living cells.
Atomic layer deposited second-order nonlinear optical metamaterial for back-end integration with CMOS-compatible nanophotonic circuitry

We report the fabrication of artificial unidimensional crystals exhibiting an effective bulk second-order nonlinearity. The crystals are created by cycling atomic layer deposition of three dielectric materials such that the resulting metamaterial is noncentrosymmetric in the direction of the deposition. Characterization of the structures by second-harmonic generation Maker-fringe measurements shows that the main component of their nonlinear susceptibility tensor is about 5x10^-10 C/Vm, which is comparable to well-established materials and more than an order of magnitude greater than reported for a similar crystal Appl. Phys. Lett.107, 121903 (2015)APPLAB0003-695110.1063/1.4931492. Our demonstration opens new possibilities for second-order nonlinear effects on CMOS-compatible nanophotonic platforms.
Determination of beam incidence conditions based on the analysis of laser interference patterns

Beam incidence conditions in the formation of two-, three- and four-beam laser interference patterns are presented and studied in this paper. In a laser interference lithography (LIL) process, it is of importance to determine and control beam incidence conditions based on the analysis of laser interference patterns for system calibration as any slight change of incident angles or intensities of beams will introduce significant variations of periods and contrasts of interference patterns. In this work, interference patterns were captured by a He-Ne laser interference system under different incidence conditions, the pattern period measurement was achieved by cross-correlation with, and the pattern contrast was calculated by image processing. Subsequently, the incident angles and intensities of beams were determined based on the analysis of spatial distributions of interfering beams. As a consequence, the relationship between the beam incidence conditions and interference patterns is revealed. The proposed method is useful for the calibration of LIL processes and for reverse engineering applications.
Enhancement of second-harmonic generation from silicon nitride with gold gratings

We report strong enhancement of second-harmonic generation in a hybrid nanostructure with gold gratings embedded in a silicon nitride film. Compared to a flat silicon nitride film, the enhancement factor can be as large as $10^2$ to $10^3$ for transverse magnetic and electric polarizations, respectively in good agreement with numerical results calculated using finite element method. For both polarizations, the enhancement arises from a resonance between the waveguide modes and grating.
Nonlinear competition in nematicon propagation

We investigate the role of competing nonlinear responses in the formation and propagation of bright spatial solitons. We use nematic liquid crystals (NLCs) exhibiting both thermo-optic and reorientational nonlinearities with continuous-wave beams. In a suitably prepared dye-doped sample and dual beam collinear geometry, thermal heating in the visible affects reorientational self-focusing in the near infrared, altering light propagation and self-trapping.

General information

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Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research group: Nonlinear Optics, Frontier Photonics, NooEL—Nonlinear Optics and OptoElectronics Laboratory, University Roma Tre, I-00146 Rome, Italy
Number of pages: 4
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Publication date: 1 Nov 2015
Peer-reviewed: Yes

Publication information

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Scopus rating (2015): SJR 2.142 SNIP 1.642 CiteScore 3.53
Scopus rating (2014): SJR 2.497 SNIP 2.056 CiteScore 3.86
Scopus rating (2013): SJR 2.458 SNIP 2.095 CiteScore 3.95
Scopus rating (2012): SJR 2.596 SNIP 1.95 CiteScore 3.52
Scopus rating (2011): SJR 2.518 SNIP 2.475 CiteScore 3.69

Original language: English
Keywords: Diffraction gratings, Harmonic generation and mixing, Subwavelength structures
Rogue Waves of Light

Studies of noise and instabilities in optics are yielding new insights into the mechanisms driving extreme events in other physical systems.

General information
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Organisations: Department of Physics, Research group: Nonlinear Fiber Optics, Research area: Optics, Frontier Photonics
Authors: Dudley, J. M., Erkintalo, M., Genty, G.
Number of pages: 8
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Peer-reviewed: Yes

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Scopus rating (2015): SJR 0.355 SNIP 0.7 CiteScore 0.61
Scopus rating (2014): SJR 0.36 SNIP 0.96 CiteScore 0.49
Scopus rating (2013): SJR 0.277 SNIP 0.799 CiteScore 0.43
Scopus rating (2012): SJR 0.306 SNIP 0.846 CiteScore 0.37
Scopus rating (2011): SJR 0.325 SNIP 0.759 CiteScore 0.36
Scopus rating (2010): SJR 0.355 SNIP 0.655
Scopus rating (2009): SJR 0.437 SNIP 0.875
Scopus rating (2008): SJR 0.467 SNIP 0.877
Scopus rating (2007): SJR 0.378 SNIP 0.664
Scopus rating (2006): SJR 0.368 SNIP 1.037
Scopus rating (2005): SJR 0.336 SNIP 1.099
Scopus rating (2004): SJR 0.277 SNIP 0.618
Scopus rating (2003): SJR 0.345 SNIP 0.495
Scopus rating (2002): SJR 0.356 SNIP 0.343
Scopus rating (2001): SJR 0.322 SNIP 0.375
Finite-size effects and interactions in artificial graphene formed by repulsive scatterers

We carry out a numerical real-space study on electrons confined in a two-dimensional triangular lattice of repulsive scattering centres. The system represents a qualitative model of molecular graphene, where the electron gas is confined between the scattering molecules in a hexagonal configuration. Our main interest is, on one hand, in the comparability of a finite system (flake) and a fully periodic one, and, on the other hand, in the role of the Coulombic electron-electron interactions and the relative strength of the scattering centres. Our real-space study shows in detail how the density of states of the fully periodic system-containing the Dirac point-is gradually formed as the size of the flake is increased. Good qualitative agreement with the experimental density of states is obtained. Our study confirms the minor role of the electron-electron interactions with selected system parameters, and shows in detail that large scattering amplitudes are required to obtain a distinctive Dirac point in the density of states.

General information
Organic Molecular Films as Light-Emitting and Light-Confining Material in Rolled-Up AlInP Semiconductor Microtube Resonators

A hybrid inorganic/organic microcavity system is presented in which an AlInP-based rolled-up microtube resonator is combined with a thin film of naphthyl end-capped bithiophene molecules. The film is laterally structured into stripes on top of the AlInP layer system before the roll-up process. During the process, the strained bilayer together with the organic molecular stripes rolls up, and a hybrid microtube is formed. The stripes act as visible-light emitters inside the otherwise passive microtube. Furthermore, they induce a light confinement in the axial direction of the microtube, additional to the radial and azimuthal confinement that is intrinsic to a microtube. As the organic material defines the cavity and represents the emitter at the same time, an efficient light coupling into the three-dimensionally confined optical modes of the microtube resonator is ensured. The hybrid microtubes open up the opportunity for novel experiments on the light–molecule interaction as well as their application in optical components.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Augmented Human Activities (AHA), Frontier Photonics, Institute of Physical Chemistry, University of Hamburg
Optical Bistability with Two Serially Integrated InP-SOAs on a Single Chip

General information
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Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Research group: Nanophotonics, Research group: Semiconductor Technology and Applications, Frontier Photonics, Rose-Hulman Institute of Technology
Authors: Plascak, M., Viheriälä, J., Guina, M., Siahmakoun, A.
Publication date: 22 Oct 2015

Host publication information
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ISBN (Print): 978-1-943580-03-3
Keywords: semiconductor optical amplifier (SOA)
DOIs:
10.1364/FIO.2015.JW2A.18
Research output: Scientific - peer-review › Conference contribution

750 nm 1.5 W frequency-doubled semiconductor disk laser with a 44 nm tuning range
We demonstrate 1.5 W of output power at the wavelength of 750 nm by intracavity frequency doubling a wafer-fused semiconductor disk laser diode-pumped at 980 nm. An optical-to-optical efficiency of 8.3% was achieved using a bismuth borate crystal. The wavelength of the doubled emission could be tuned from 720 to 764 nm with an intracavity birefringent plate. The beam quality parameter M2 of the laser output was measured to be below 1.5 at all pump powers. The laser is a promising tool for biomedical applications that can take advantage of the large penetration depth of light in tissue in the 700–800 nm spectral range.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Ultrafast and intense lasers, Research group: Semiconductor Technology and Applications, Frontier Photonics
Authors: Saarinen, E., Lyytikäinen, J., Ranta, S., Rantamäki, A., Sirbu, A., Iakovlev, V., Kapon, E., Okhotnikov, O.
Number of pages: 4
Pages: 4380-4383
Publication date: 1 Oct 2015
Peer-reviewed: Yes
Direct Laser Writing of Fluorescent Silver Nanoclusters in Polyvinyl Alcohol Films
We demonstrate successful fabrication of fluorescent microstructures by direct laser writing of silver nanoclusters in polyvinyl alcohol films using a cost-effective laser diode. The nanoclusters show very good photostability in the widely used polymer material.

Observation of Beam Self-Induced Transition from Positive to Negative Optical Refraction in Nematic Liquid Crystals
We demonstrate that light refraction at a straight interface between an isotropic dielectric and a nematic liquid crystal can change from positive to negative depending on power. The phenomenon relies on the reorientational response and the all-optical rotation of the optic axis, causing in turn variations in walk-off and beam self-steering.
Nonlinear negative refraction in reorientational soft matter
We analyze the propagation of self-trapped optical beams close to the Fréedericksz threshold in nematic liquid crystals. Accounting for power-dependent changes in walk-off due to the all-optical response, we demonstrate that light beams can switch from positive to negative refraction according to the excitation.

General information
State: Published

Publication information
Journal: Physical Review A
Volume: 92
Incoherent broadband cavity enhanced absorption spectroscopy using supercontinuum and superluminescent diode sources

We investigate incoherent broadband cavity enhanced absorption spectroscopy using a tailored supercontinuum source. By tailoring the supercontinuum spectrum to match the high reflectivity bandwidth of the mirrors, we achieve an unprecedented spectral brightness of more than 7 dBm/nm at wavelengths where the effective absorption path length in the cavity exceeds 40 km. We demonstrate the potential of the source in spectrally broadband measurement of weak overtone transitions of carbon dioxide and methane in the near-infrared 1590 nm-1700 nm range and evaluate its performance against that of a typical superluminescent diode source. Minimum detectable absorption coefficients (3σ) of 2.2 × 10^{-9} cm^{-1} and 6.2 × 10^{-9} cm^{-1} are obtained with the supercontinuum and the superluminescent diode sources, respectively. We further develop a spectral fitting method based on differential optical absorption spectroscopy to fully and properly account for the combined effect of absorption line saturation and limited spectral resolution of the detection. The method allows to cope with high dynamic range of absorption features typical of real-world multicomponent measurements.

General information
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Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research group: Nonlinear Fiber Optics, Research group: Applied Optics, Frontier Photonics, Metrology Research Institute, Aalto University
Authors: Aalto, A., Genty, G., Laurila, T., Toivonen, J.
Number of pages: 10
Pages: 25225-25234
Publication date: 17 Sep 2015
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Publication information
Journal: Optics Express
Volume: 23
Issue number: 19
Redox-induced activation of the proton pump in the respiratory complex I

Complex I functions as a redox-linked proton pump in the respiratory chains of mitochondria and bacteria, driven by the reduction of quinone (Q) by NADH. Remarkably, the distance between the Q reduction site and the most distant proton channels extends nearly 200 Å. To elucidate the molecular origin of this long-range coupling, we apply a combination of large-scale molecular simulations and a site-directed mutagenesis experiment of a key residue. In hybrid quantum mechanics/molecular mechanics simulations, we observe that reduction of Q is coupled to its local protonation by the His-38/Asp-139 ion pair and Tyr-87 of subunit Nqo4. Atomistic classical molecular dynamics simulations further suggest that formation of quinol (QH2) triggers rapid dissociation of the anionic Asp-139 toward the membrane domain that couples to conformational changes in a network of conserved charged residues. Site-directed mutagenesis data confirm the importance of Asp-139; upon mutation to asparagine the Q reductase activity is inhibited by 75%. The current results, together with earlier biochemical data, suggest that the proton pumping in complex I is activated by a unique combination of electrostatic and conformational transitions.
ISSN (Print): 0027-8424
Ratings:
Scopus rating (2016): CiteScore 8.56 SJR 6.321 SNIP 2.629
Scopus rating (2015): SJR 6.767 SNIP 2.682 CiteScore 8.84
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Scopus rating (2013): SJR 6.989 SNIP 2.73 CiteScore 9.5
Scopus rating (2012): SJR 6.792 SNIP 2.682 CiteScore 9.49
Scopus rating (2011): SJR 6.771 SNIP 2.636 CiteScore 9.31
Scopus rating (2010): SJR 6.769 SNIP 2.529
Scopus rating (2009): SJR 6.913 SNIP 2.544
Scopus rating (2008): SJR 6.899 SNIP 2.445
Scopus rating (2007): SJR 6.766 SNIP 2.441
Scopus rating (2006): SJR 6.734 SNIP 2.434
Scopus rating (2005): SJR 6.784 SNIP 2.551
Scopus rating (2004): SJR 7.026 SNIP 2.622
Scopus rating (2003): SJR 7.018 SNIP 2.501
Scopus rating (2002): SJR 7.183 SNIP 2.471
Scopus rating (2001): SJR 7.192 SNIP 2.463
Scopus rating (2000): SJR 7.731 SNIP 2.475
Scopus rating (1999): SJR 8.271 SNIP 2.446
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Keywords: Cell respiration, Electron transfer, Molecular dynamics simulations, NADH-quinone oxidoreductase, QM/MM simulations
ASJC Scopus subject areas: General
DOIs: 10.1073/pnas.1503761112
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Research output: Scientific - peer-review › Article

Multiple surface lattice resonances in second-harmonic generation from metasurfaces

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Physics, Research area: Optics, Research group: Nonlinear Optics, Frontier Photonics, Univ Eastern Finland, University of Eastern Finland, Inst Photon
Authors: Kauranen, M., Czaplicki, R., Mäkitalo, J., Laukkanen, J., Lehtolahti, J., Kuittinen, M.
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Publisher: IEEE
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ISBN (Electronic): 978-1-4799-7836-6
DOIs: 10.1109/MetaMaterials.2015.7342475
Research output: Scientific - peer-review › Conference contribution

Two-step semiclassical model for strong-field ionization with interference and multielectron polarization effects
We present a semiclassical model for above-threshold ionization with the inclusion of the Stark shift of the initial bound state, the Coulomb potential, and a polarization induced dipole potential capable to describe quantum interference. The model will be used to investigate the imprints of polarization effects in the interference structure of electron momentum distributions.
Highly Nonlinear Dispersion Increasing Fiber for Femtosecond Pulse Generation

The optical pulse evolution in a highly nonlinear normal dispersion-increasing fiber has been considered, both experimentally and theoretically. It was found that large spectral broadening in tapered waveguides could occur without temporal instabilities and impose the linear frequency modulation, i.e., chirp, required for high-quality pulse compression. The pedestal-free pulses have been demonstrated after dechirping in a standard single-mode fiber.

General information
State: Published
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Organisations: Optoelectronics Research Centre, Research group: Ultrafast and intense lasers, Prokhorov General Physics Institute, Russian Academy of Sciences, Laboratory of Quantum Electronics and Optoelectronics, Ulyanovsk State University
Authors: Korobko, D. A., Okhotnikov, O. G., Stoliarov, D. A., Sysoliatin, A. A., Zolotovskii, I. O.
Number of pages: 6
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Publication information
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Scopus rating (2016): SJR 1.233 SNIP 1.881 CiteScore 3.87
Scopus rating (2015): SJR 1.689 SNIP 1.955 CiteScore 4.15
The effects of unintentional boron contamination on optical properties of GaInP/AlGaInP quantum well structures grown by molecular beam epitaxy (MBE) are reported. Photoluminescence and secondary-ion mass spectrometry (SIMS) measurements revealed that the optical activity of boron-contaminated quantum wells is heavily affected by the amount of boron in GaInP/AlGaInP heterostructures. The boron concentration was found to increase when cracking temperature of the phosphorus source was increased. Boron incorporation was enhanced also when aluminum was present in the material.

### General information
- **State:** Published
- **Ministry of Education publication type:** A1 Journal article-refereed
- **Organisations:** Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Frontier Photonics, VTT Technical Research Centre of Finland
- **Authors:** Tukiainen, A., Likonen, J., Toikkanen, L., Leinonen, T.
- **Pages:** 60-63
- **Publication date:** 1 Sep 2015
- **Peer-reviewed:** Yes

### Publication information
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- **Volume:** 425
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  - Scopus rating (2016): SJR 0.735 SNIP 1.175 CiteScore 1.69
  - Scopus rating (2015): SJR 0.716 SNIP 1.174 CiteScore 1.63
  - Scopus rating (2014): SJR 0.795 SNIP 1.184 CiteScore 1.69
  - Scopus rating (2013): SJR 0.831 SNIP 1.221 CiteScore 1.78
  - Scopus rating (2012): SJR 0.956 SNIP 1.246 CiteScore 1.68
  - Scopus rating (2011): SJR 0.96 SNIP 1.425 CiteScore 1.89
  - Scopus rating (2010): SJR 1.163 SNIP 1.206
  - Scopus rating (2009): SJR 1.068 SNIP 1.202
  - Scopus rating (2008): SJR 1.161 SNIP 1.236
How large are nonadiabatic effects in atomic and diatomic systems?

With recent developments in simulating nonadiabatic systems to high accuracy, it has become possible to determine how much energy is attributed to nuclear quantum effects beyond zero-point energy. In this work, we calculate the non-relativistic ground-state energies of atomic and molecular systems without the Born-Oppenheimer approximation. For this purpose, we utilize the fixed-node diffusion Monte Carlo method, in which the nodes depend on both the electronic and ionic positions. We report ground-state energies for all systems studied, ionization energies for the first-row atoms and atomization energies for the first-row hydrides. We find the ionization energies of the atoms to be nearly independent of the Born-Oppenheimer approximation, within the accuracy of our results. The atomization energies of molecular systems, however, show small effects of the nonadiabatic coupling between electrons and nuclei.
Parity-time-symmetric solitons in trapped Bose-Einstein condensates and the influence of varying complex potentials: A variational approach

Dynamics and properties of nonlinear matter waves in a trapped BEC subject to a PT-symmetric linear potential, with the trap in the form of a super-Gaussian potential, are investigated via a variational approach accounting for the complex nature of the soliton. In the process, we address how the shape of the imaginary part of the potential, that is, a gain-loss mechanism, affects the self-localization and the stability of the condensate. Variational results are found to be in good agreement with full numerical simulations for predicting the shape, width, and chemical potential of the condensate until the PT breaking point. Variational computation also predicts the existence of solitary solution only above a threshold in the particle number as the gain-loss is increased, in agreement with numerical simulations.

General information
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Organisations: Department of Physics, Research group: Nonlinear Optics, Frontier Photonics, Universidade do Porto, Univ Roma Tre, Roma Tre University, Dept Elect Engn, NooEL, Cochin University of Science and Technology, Centro de Física Do Porto
Authors: Devassy, L., Jisha, C. P., Alberucci, A., Kuriakose, V. C.
Number of pages: 12
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Scopus rating (2015): SJR 1.047 SNIP 0.978 CiteScore 1.89
Scopus rating (2014): SJR 1.22 SNIP 1.123 CiteScore 2.05
Scopus rating (2013): SJR 1.311 SNIP 1.239 CiteScore 2.28
Scopus rating (2012): SJR 1.42 SNIP 1.226 CiteScore 2.28
Scopus rating (2011): SJR 1.485 SNIP 1.225 CiteScore 2.28
Scopus rating (2010): SJR 1.69 SNIP 1.215
Scopus rating (2009): SJR 1.694 SNIP 1.259
Scopus rating (2008): SJR 1.96 SNIP 1.314
Scopus rating (2007): SJR 1.926 SNIP 1.332
Scopus rating (2006): SJR 1.787 SNIP 1.324
Scopus rating (2005): SJR 1.71 SNIP 1.302
Scopus rating (2004): SJR 1.672 SNIP 1.214
Scopus rating (2003): SJR 1.303 SNIP 1.166
Scopus rating (2002): SJR 0.936 SNIP 1.241
Scopus rating (2001): SJR 0.709 SNIP 1.429
Bringing High-Performance GaInNAsSb/GaAs SOAs to True Data Applications

We experimentally demonstrate the high-speed data processing capabilities of a GaInNAsSb semiconductor optical amplifier operating at 1.55 μm. The investigated structure exhibits good thermal characteristics and fast gain dynamics with 10%-90% recovery time of 55 ps. Successful wavelength conversion of 10-Gb/s signals is reported. A maximum power penalty of <2.4 dB for return to zero formatting and of 1.9 dB for nonreturn to zero is demonstrated.

General information
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Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Research group: Nanophotonics, Frontier Photonics, Photonics Research Communications Laboratory, National Technological University of Athens
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Publication information
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Scopus rating (2015): SJR 1.263 SNIP 1.327 CiteScore 2.62
Scopus rating (2014): SJR 1.487 SNIP 1.547 CiteScore 2.95
Scopus rating (2013): SJR 1.263 SNIP 1.706 CiteScore 2.46
Scopus rating (2012): SJR 1.51 SNIP 2.012 CiteScore 2.48
Scopus rating (2010): SJR 1.47 SNIP 1.623
Scopus rating (2009): SJR 1.775 SNIP 1.804
Scopus rating (2008): SJR 2.081 SNIP 1.818
Scopus rating (2007): SJR 2.345 SNIP 1.566
Scopus rating (2006): SJR 2.112 SNIP 1.884
Scopus rating (2005): SJR 2.97 SNIP 2.454
Scopus rating (2004): SJR 3.286 SNIP 2.716
Scopus rating (2003): SJR 3.44 SNIP 2.467
Scopus rating (2002): SJR 3.566 SNIP 2.117
Scopus rating (2001): SJR 3.519 SNIP 1.678
Scopus rating (2000): SJR 2.345 SNIP 1.202
Scopus rating (1999): SJR 2.44 SNIP 1.302
Original language: English
ASJC Scopus subject areas: Electrical and Electronic Engineering, Atomic and Molecular Physics, and Optics, Electronic, Optical and Magnetic Materials
Keywords: dilute nitrides, Photonic integration, semiconductor optical amplifier (SOA), wavelength conversion
Caustics and rogue waves in an optical sea
There are many examples in physics of systems showing rogue wave behaviour, the generation of high amplitude events at low probability. Although initially studied in oceanography, rogue waves have now been seen in many other domains, with particular recent interest in optics. Although most studies in optics have focussed on how nonlinearity can drive rogue wave emergence, purely linear effects have also been shown to induce extreme wave amplitudes. In this paper, we report a detailed experimental study of linear rogue waves in an optical system, using a spatial light modulator to impose random phase structure on a coherent optical field. After free space propagation, different random intensity patterns are generated, including partially-developed speckle, a broadband caustic network, and an intermediate pattern with characteristics of both speckle and caustic structures. Intensity peaks satisfying statistical criteria for rogue waves are seen especially in the case of the caustic network, and are associated with broader spatial spectra. In addition, the electric field statistics of the intermediate pattern shows properties of an optical sea with near-Gaussian statistics in elevation amplitude, and trough-to-crest statistics that are near-Rayleigh distributed but with an extended tail where a number of rogue wave events are observed.

The critical velocity of rebound determined for sub-micron silver particles with a variable nozzle area impactor
The critical velocity of rebound was determined for spherical silver aerosol particles in the size range of 20-1000 nm. A novel instrument, a variable nozzle area impactor, was especially designed for measuring the particle-surface interaction as a function of the particle impact velocity. The experimental results were combined with a numerical model in order to obtain the impact velocities. The experiments were carried out using a plain aluminum collection substrate in the impactor. Our results show that the critical velocity of rebound decreases from 14 to 0.022 m/s as the particle size increases from 20 to 1000 nm. Furthermore, the critical velocity was found to be proportional to the power of -1.6 of the particle size, instead of the theoretical inverse proportionality. This result is in line with the previous studies for micron-sized particles. In the nanoparticle size range, the obtained values are approximately 3-10 times greater than the recent literature values. This discrepancy can most likely be explained by the different surface materials. All in all, our results give valuable information about the particle-surface interactions in the sub-micron size range.
Dual-Mode Multi-Section Lasers with Nanoscale Surface Gratings

Dual-mode multi-section distributed-feedback lasers with surface gratings have been fabricated using UV nanoimprint lithography. Frequency differences from 14GHz to 1.3THz for different longitudinal structures and frequency difference modulation speed up to 500MHz have been measured.
615 nm GaInNAs VECSEL with output power above 10 W

A high-power optically-pumped vertical-external-cavity surface-emitting laser (VECSEL) generating 10.5 W of cw output power at 615 nm is reported. The gain mirror incorporated 10 GaInNAs quantum wells and was designed to have an emission peak in the 1230 nm range. The fundamental emission was frequency doubled to the red spectral range by using an intra-cavity nonlinear LBO crystal. The maximum optical-to-optical conversion efficiency was 17.5%. The VECSEL was also operated in pulsed mode by directly modulating the pump laser to produce light pulses with duration of ~1.5 µs. The maximum peak power for pulsed operation (pump limited) was 13.8 W. This corresponded to an optical-to-optical conversion efficiency of 20.4%.
Quantifying non-ergodic dynamics of force-free granular gases

Brownian motion is ergodic in the Boltzmann-Khinchin sense that long time averages of physical observables such as the mean squared displacement provide the same information as the corresponding ensemble average, even at out-of-equilibrium conditions. This property is the fundamental prerequisite for single particle tracking and its analysis in simple liquids. We study analytically and by event-driven molecular dynamics simulations the dynamics of force-free cooling granular gases and reveal a violation of ergodicity in this Boltzmann-Khinchin sense as well as distinct ageing of the system. Such granular gases comprise materials such as dilute gases of stones, sand, various types of powders, or large molecules, and their mixtures are ubiquitous in Nature and technology, in particular in Space. We treat - depending on the physical-chemical properties of the inter-particle interaction upon their pair collisions - both a constant and a velocity-dependent (viscoelastic) restitution coefficient $\epsilon$. Moreover we compare the granular gas dynamics with an effective single particle stochastic model based on an underdamped Langevin equation with time dependent diffusivity. We find that both models share the same behaviour of the ensemble mean squared displacement (MSD) and the velocity correlations in the limit of weak dissipation. Qualitatively, the reported non-ergodic behaviour is generic for granular gases with any realistic dependence of $\epsilon$ on the impact velocity of particles.
Real sequence effects on the search dynamics of transcription factors on DNA

Recent experiments show that transcription factors (TFs) indeed use the facilitated diffusion mechanism to locate their target sequences on DNA in living bacteria cells: TFs alternate between sliding motion along DNA and relocation events through the cytoplasm. From simulations and theoretical analysis we study the TF-sliding motion for a large section of the DNA-sequence of a common E. coli strain, based on the two-state TF-model with a fast-sliding search state and a recognition state enabling target detection. For the probability to detect the target before dissociating from DNA the TF-search times self-consistently depend heavily on whether or not an auxiliary operator (an accessible sequence similar to
the main operator) is present in the genome section. Importantly, within our model the extent to which the interconversion rates between search and recognition states depend on the underlying nucleotide sequence is varied. A moderate dependence maximises the capability to distinguish between the main operator and similar sequences. Moreover, these auxiliary operators serve as starting points for DNA looping with the main operator, yielding a spectrum of target detection times spanning several orders of magnitude. Auxiliary operators are shown to act as funnels facilitating target detection by TFs.

**Optimal emission enhancement in orthogonal double-pulse laser-induced breakdown spectroscopy**

Abstract Orthogonal double-pulse (DP) laser-induced breakdown spectroscopy (LIBS) was performed using reheating and pre-ablative configurations. The ablation pulse power density was varied by two orders of magnitude and the DP experiments were carried out for a wide range of interpulse delays. For both DP-LIBS schemes, the signal enhancement was evaluated with respect to the corresponding single-pulse (SP) LIBS as a function of the interpulse delay. The reheating scheme shows a sharp maximum signal enhancement of up to 200-fold for low ablative power densities (0.4 GW cm\(^{-2}\)); however, for power densities larger than 10 GW cm\(^{-2}\) this configuration did not improve the SP outcome. On the other hand, a more uniform signal enhancement of about 4-6 was obtained for the pre-ablative scheme nearly independently of the used ablative power density. In terms of the signal-to-noise ratio (SNR) the pre-ablative scheme shows a monotonic increment with the ablative power density. Whereas the reheating configuration reaches a maximum at 2.2 GW cm\(^{-2}\), its enhancement effect collapses markedly for fluencies above 10 GW cm\(^{-2}\).
Phase State and Deliquescence Hysteresis of Ammonium-Sulfate-Seeded Secondary Organic Aerosol

The phase state of secondary organic aerosol (SOA) has an impact on its lifetime, composition, and its interaction with water. To better understand the effect of phase state of SOA on climate interactions, we studied the SOA phase state and the effect of its history and report here the phase state and the humidity-induced phase hysteresis of multicomponent-seeded SOA particles produced in a large, continuously stirred tank reactor. We determined the phase state of the particles by their bounced fraction impacting on a smooth substrate in a low-pressure impactor. The particles were composed of ammonium sulfate ([NH4]2SO4) seed and a secondary organic matter (SOM) shell formed from oxidized alpha-pinene or isoprene. The ammonium sulfate (AS) seed dominated the deliquescence of the alpha-pinene SOM multicomponent particles, whereas their efflorescence was strongly attenuated by the SOM coating. Particles coated with isoprene SOM showed continuous phase transitions with a lesser effect by the AS seed. The results agree with and independently corroborate contemporary research.

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General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research area: Aerosol Physics, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group, Urban circular bioeconomy (UrCirBio), Univ Eastern Finland, University of Eastern Finland, Dept Appl Phys, AeroMegt GmbH, Nanyang Technol Univ, Nanyang Technological University, Nanyang Technological University & National Institute of Education (NIE) Singapore, Earth Observ Singapore
Authors: Saukko, E., Zorn, S., Kuwata, M., Keskinen, J., Virtanen, A.
Number of pages: 7
Pages: 531-537
Publication date: 3 Jul 2015
Peer-reviewed: Yes
How To Minimize Artifacts in Atomistic Simulations of Membrane Proteins, Whose Crystal Structure Is Heavily Engineered: beta(2)-Adrenergic Receptor in the Spotlight

Atomistic molecular dynamics (MD) simulations are used extensively to elucidate membrane protein properties. These simulations are based on three-dimensional protein structures that in turn are often based on crystallography. The protein structures resolved in crystallographic studies typically do not correspond to pristine proteins, however. Instead the crystallized proteins are commonly engineered, including structural modifications (mutations, replacement of protein sequences by antibodies, bound ligands, etc.) whose impact on protein structure and dynamics is largely unknown. Here we explore this issue through atomistic MD simulations (,5 its in total), focusing on the beta(2)-adrenergic receptor (beta(2)AR) that is one of the most studied members of the G-protein coupled receptor superfamily. Starting from an inactive-state crystal structure beta(2)AR, we remove the many modifications in beta(2)AR systematically one at a time, in six consecutive steps. After each step, we equilibrate the system and simulate it quite extensively. The results of this step-by-step approach highlight that the structural modifications used in crystallization can affect ligand and G-protein binding sites, packing at the transmembrane-helix interface region, and the dynamics of connecting loops in beta(2)AR. When the results of the systematic step-by-step approach are compared to an all-at-once technique where all modifications done on beta(2)AR are removed instantaneously at the same time, it turns out that the step-by-step method provides results that are superior in terms of maintaining protein structural stability. The results provide compelling evidence that for membrane proteins whose 3D structure is based on structural engineering, the preparation of protein structure for atomistic MD simulations is a delicate and sensitive process. The results show that most valid results are found when the structural modifications are reverted slowly, one at a time.
Studies of Physical Phase State of Aerosol Nanoparticles

Aerosol particles produced in the atmosphere have major effects on the life on Earth: cloud formation starts on seed particles, often formed by photochemical oxidation of biogenic volatile organic compounds; visibility, corrosion, and health problems are caused by anthropogenic hydrocarbon and sulfur emission processed into particles by the atmosphere and the sun.

Naturally occurring secondary organic aerosol (SOA) particles can produce up to a half of the non-refractory mass of aerosol particles of less than micrometer in size. This makes SOA a large contributing factor to the climate system of the Earth. The actual effect that these particles have is, however, not well known, compared to the other effects affecting the climate. The research effort to increase the understanding and reduce the uncertainties around the climate effects of SOA encompasses an interdisciplinary research community.

The recent advance made by the observation of a solid phase of SOA by Virtanen et al. (2010) was the starting point for this thesis. The solid phase of SOA particles means that a long-held assumption of a partition equilibrium between the condensed phase and the gas phase of the semivolatile species may be wrong and produce too low a timescale for the particle chemical reaction rates and uptake coefficients.

This work consists of new developments in the instrumentation of particle properties as well as new observations of laboratory-generated secondary organic aerosol. The method development has two branches, one concentrates on finding more information from the measurement signal of an electrical low pressure impactor (ELPI) used in a somewhat unconventional way, whereas the other consists of a new detection method for particle bounce and response to different humidity and phase hysteresis induced by a carefully controlled humidity history.

The methods and observations made during this work are by no means the final word on the subject, but they are being used and further developed by the scientific community. Study of the particle phase and bounce as well as SOA mechanical properties and kinetics is well underway, and its results will be used to further refine the understanding of both aerosol fundamentals as well as the climate system.
Impact of Axial Profile of the Gain Medium on the Mode Instability in Lasers: Regular Versus Tapered Fibers
The presented paper describes the new concept for suppression of mode instability in high power fiber lasers and amplifiers based on tapered (i.e. axially non-regular) double-clad few-mode gain architecture.

High power GaInNAs VECSEL emitting at 1230/615 nm
We report a frequency-doubled VECSEL operating at 1230/615 nm. The gain chip was grown by plasma-assisted MBE and comprised 10 GaInNAs quantum wells. Preliminary experiments show an output power of >8 W at 615 nm.
**High repetition rate 1.34 µm Nd:YVO4 microchip laser Q-switched with GaInNAs SESAM**

We demonstrate 1.34-um Nd:YVO4 microchip laser Q-switched with a GaInNAs/GaAs-based SESAM. The laser produced 204 ps long pulses with 24 mW average power and 2.3-MHz repetition rate.

**General information**
- State: Published
- Ministry of Education publication type: A4 Article in a conference publication
- Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications
- Authors: Nikkinen, J., Korpijärvi, V., Leino, I., Härkönen, A., Guina, M.
- Publication date: 22 Jun 2015

**Host publication information**
- Title of host publication: The European Conference on Lasers and Electro-Optics 2015
- Publisher: OSA
- Article number: CA_5b_1
- ISBN (Electronic): 978-1-4673-7475-0
- Links: https://www.osapublishing.org/abstract.cfm?uri=CLEO_Europe-2015-CA_5b_1
- Research output: Scientific - peer-review › Conference contribution

**Fabrication of Single Wall Carbon Nanotube Saturable Absorber in the Micro-grooved Single Mode Fiber**

We describe technological solution for fabrication of single wall carbon nanotube (SWCNT) based saturable absorber. The mode-locking of Tm/Ho fiber laser with the fiber-integrated SWCNT saturable absorber was confirmed.

**General information**
- State: Published
- Ministry of Education publication type: A4 Article in a conference publication
- Organisations: Optoelectronics Research Centre, Research group: Ultrafast and intense lasers, Center for Physical Sciences and Technology, Ekspla Uab, Altechna uab, Vilnius Univ, Vilnius University, Inst Appl Res
- Authors: Viskontas, K., Mikutis, M., Pilipavicius, J., Gumenyuk, R., Okhotnikov, O., Rusteika, N.
- Publication date: 21 Jun 2015

**Host publication information**
- Title of host publication: The European Conference on Lasers and Electro-Optics 2015
- Publisher: Optical Society of America OSA
- Article number: paper CE_P_35
- ISBN (Electronic): 978-1-4673-7475-0
- Research output: Scientific - peer-review › Conference contribution

**High-power 1550 nm tapered DBR lasers fabricated using soft UV-nanoimprint lithography**

We report 1.55µm DBR-RWG grating design, the fabrication process, and the output characteristics of tapered DBR lasers patterned using novel soft UV-NIL. DBR lasers exhibited CW output power of 400mW and side-mode-suppression-ratio of 45dB.

**General information**
- State: Published
- Organisations: Optoelectronics Research Centre, Research group: Nanophotonics, Research group: Semiconductor Technology and Applications
- Authors: Viheriälä, J., Mäkelä, J., Aho, A., Virtanen, H., Leinonen, T., Dumitrescu, M., Guina, M.
- Number of pages: 1
- Pages: -
- Publication date: 21 Jun 2015
- Peer-reviewed: Unknown
Second-harmonic generation from thermally-evaporated indium selenide thin films

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Department of Physics, Research group: Nonlinear Optics, Research area: Optics
Authors: Slablab, A., Divya, S., Koskinen, K., Czaplicki, R., Kaillasnath, M., Radhakrishnan, P., Kauranen, M.
Pages: CE_12_4
Publication date: 21 Jun 2015

Host publication information
Title of host publication: The European Conference on Lasers and Electro-Optics 2015 : Munich Germany 21–25 June 2015
Publisher: Optical Society of America
ISBN (Electronic): 978-1-4673-7475-0
Links:
Source: Bibtex
Source-ID: urn:888ad7045d652720bf995336ec1122eb
Research output: Scientific › Conference contribution

Edge filter enhanced self-mixing interferometry
Self-mixing interferometry (SMI) represents a simple, robust, and self-aligned technique for metrology applications. Still, its applicability on diffuse targets is limited to distances up to few meters. We present an enhanced approach based on the detection of the frequency-modulated (FM) self-mixing signal. The FM signal detection is achieved using an acetylene edge filter that maps laser frequency variations into intensity variations as the laser wavelength is tuned to the edge of the steep absorption profile. An experimental comparison between the enhanced and the conventional SMI approach is presented. The new approach yields to about two orders of magnitude larger signal-to-noise ratio and extends the applicability of SMI into new fields allowing longer detection ranges and lower backscattering signals. (C) 2015 Optical Society of America

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research area: Optics, Research group: Applied Optics, Frontier Photonics, Vaisala Oyj
Authors: Contreras, V., Lonnqvist, J., Toivonen, J.
Number of pages: 4
Pages: 2814-2817
Publication date: 15 Jun 2015
Peer-reviewed: Yes

Publication information
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Volume: 40
Issue number: 12
ISSN (Print): 0146-9592
Ratings:
Scopus rating (2016): CiteScore 3.54 SJR 1.864 SNIP 1.658
Scopus rating (2015): SJR 2.142 SNIP 1.642 CiteScore 3.53
Scopus rating (2014): SJR 2.497 SNIP 2.056 CiteScore 3.86
Scopus rating (2013): SJR 2.458 SNIP 2.095 CiteScore 3.95
Scopus rating (2012): SJR 2.596 SNIP 1.95 CiteScore 3.52
Scopus rating (2011): SJR 2.518 SNIP 2.475 CiteScore 3.69
Scopus rating (2010): SJR 2.669 SNIP 2.293
Long-range soliton interactions through gain-absorption depletion and recovery

We report the interpulse dynamics in fiber soliton laser because of depletion and relaxation of gain and absorption. The soliton interaction range is shown to depend largely on the relaxation time of dissipative parameters while the compensation of the dynamical gain and absorption depletion leads to the formation of stationary soliton groups with unequal interpulse distances.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Ultrafast and intense lasers, Ulyanovsk State Univ
Authors: Korobko, D. A., Okhotnikov, O. G., Zolotovskii, I. O.
Number of pages: 4
Pages: 2862-2865
Publication date: 15 Jun 2015
Peer-reviewed: Yes

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Journal: Optics Letters
Volume: 40
Issue number: 12
ISSN (Print): 0146-9592
Ratings:
Scopus rating (2016): CiteScore 3.54 SJR 1.864 SNIP 1.658
Scopus rating (2015): SJR 2.142 SNIP 1.642 CiteScore 3.53
Scopus rating (2014): SJR 2.497 SNIP 2.056 CiteScore 3.86
Scopus rating (2013): SJR 2.458 SNIP 2.095 CiteScore 3.95
Scopus rating (2012): SJR 2.596 SNIP 1.95 CiteScore 3.52
Scopus rating (2011): SJR 2.518 SNIP 2.475 CiteScore 3.69
Scopus rating (2010): SJR 2.669 SNIP 2.293
Scopus rating (2009): SJR 3.167 SNIP 2.665
Scopus rating (2008): SJR 3.408 SNIP 2.378
Scopus rating (2007): SJR 3.489 SNIP 2.102
Scopus rating (2006): SJR 3.143 SNIP 2.334
Scopus rating (2005): SJR 3.251 SNIP 2.483
Scopus rating (2004): SJR 3.521 SNIP 2.718
Scopus rating (2003): SJR 3.708 SNIP 2.573
Scopus rating (2002): SJR 3.702 SNIP 2.39
Scopus rating (2001): SJR 3.62 SNIP 2.244
Scopus rating (2000): SJR 3.416 SNIP 1.705
Adiabatic and nonadiabatic static polarizabilities of H and H2

The path-integral Monte Carlo method is employed to evaluate static (hyper)polarizabilities of small hydrogen systems at finite temperature. Exact quantum statistics are obtained for hydrogen atom and hydrogen molecule immersed in homogeneous electric field. The method proves to be reliable and yields perfect agreement with known values of static polarizabilities in both adiabatic and nonadiabatic simulations. That is, we demonstrate how electronic, rotational, and vibrational contributions can be evaluated either separately or simultaneously. Indeed, at finite temperature and nonzero-field strengths we observe considerable rovibrational effects in the polarization of the hydrogen molecule. Given sufficient computational resources, the path-integral Monte Carlo method turns out to be a straightforward tool for describing and computing static polarizabilities for traditionally challenging regimes.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research group: Semiconductor Technology and Applications, Research group: Electronic Structure Theory, Computational Science X (CompX)
Authors: Tiihonen, J., Kylänpää, I., Rantala, T. T.
Publication date: 12 Jun 2015
Peer-reviewed: Yes

Publication information
Journal: Physical Review A
Volume: 91
Issue number: 6
Article number: 062503
ISSN (Print): 1050-2947
Ratings:
Scopus rating (2016): CiteScore 2.25 SJR 1.281 SNIP 0.852
Scopus rating (2015): SJR 1.451 SNIP 0.903 CiteScore 2.06
Scopus rating (2014): SJR 2.121 SNIP 1.146 CiteScore 2.46
Scopus rating (2013): SJR 2.317 SNIP 1.179 CiteScore 2.86
Scopus rating (2012): SJR 2.515 SNIP 1.239 CiteScore 2.81
Scopus rating (2011): SJR 2.31 SNIP 1.261 CiteScore 2.79
Scopus rating (2010): SJR 2.403 SNIP 1.22
Scopus rating (2009): SJR 2.475 SNIP 1.305
Scopus rating (2008): SJR 2.559 SNIP 1.241
Scopus rating (2007): SJR 2.618 SNIP 1.259
Scopus rating (2006): SJR 2.342 SNIP 1.257
Scopus rating (2005): SJR 2.017 SNIP 1.286
Scopus rating (2004): SJR 2.168 SNIP 1.1
Scopus rating (2003): SJR 2.05 SNIP 1.078
Scopus rating (2002): SJR 2.037 SNIP 1.191
Scopus rating (2001): SJR 2.204 SNIP 1.521
Scopus rating (2000): SJR 2.494 SNIP 1.33
Scopus rating (1999): SJR 2.696 SNIP 1.366
Original language: English
ASJC Scopus subject areas: Atomic and Molecular Physics, and Optics
Keywords: hyperpolarizability, hydrogen, hydrogen molecule, path integral Monte Carlo, finite temperature
DOIs:
10.1103/PhysRevA.91.062503
Links:
http://www.scopus.com/inward/record.url?scp=84937404643&partnerID=8YFLogxK (Link to publication in Scopus)
Dynamics of the peripheral membrane protein P2 from human myelin measured by neutron scattering: A Comparison between wild-type protein and a hinge mutant

Myelin protein P2 is a fatty acid-binding structural component of the myelin sheath in the peripheral nervous system, and its function is related to its membrane binding capacity. Here, the link between P2 protein dynamics and structure and function was studied using elastic incoherent neutron scattering (EINS). The P38G mutation, at the hinge between the β barrel and the α-helical lid, increased the lipid stacking capacity of human P2 in vitro, and the mutated protein was also functional in cultured cells. The P38G mutation did not change the overall structure of the protein. For a deeper insight into P2 structure-function relationships, information on protein dynamics in the 10 ps to 1 ns time scale was obtained using EINS. Values of mean square displacements mainly from protein H atoms were extracted for wild-type P2 and the P38G mutant and compared. Our results show that at physiological temperatures, the P38G mutant is more dynamic than the wild-type P2 protein, especially on a slow 1-ns time scale. Molecular dynamics simulations confirmed the enhanced dynamics of the mutant variant, especially within the portal region in the presence of bound fatty acid. The increased softness of the hinge mutant of human myelin P2 protein is likely related to an enhanced flexibility of the portal region of this fatty acid-binding protein, as well as to its interactions with the lipid bilayer surface requiring conformational adaptations.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research group: Biological Physics and Soft Matter, Computational Science X (CompX), University of Oulu, Univ Bergen, University of Bergen, Dept Phys & Technol, Biochemistry and Molecular Medicine and Biocenter Oulu, German Electron Synchrotron (DESY), European Spallation Source (ESS), Max Planck Institute for Experimental Medicine, Institut Laue-Langevin, Department of Biomedicine, CNR-IOM
Authors: Laulumaa, S., Nieminen, T., Lehtimäki, M., Aggarwal, S., Simons, M., Koza, M. M., Vattulainen, I., Kursula, P., Natali, F.
Publication date: 11 Jun 2015
Peer-reviewed: Yes

Publication information
Journal: PLoS One
Volume: 10
Issue number: 6
Article number: e128954
ISSN (Print): 1932-6203
Ratings:
Scopus rating (2016): CiteScore 3.11 SJR 1.201 SNIP 1.092
Scopus rating (2015): SJR 1.414 SNIP 1.131 CiteScore 3.32
Scopus rating (2014): SJR 1.545 SNIP 1.141 CiteScore 3.54
Scopus rating (2013): SJR 1.74 SNIP 1.147 CiteScore 3.94
Scopus rating (2012): SJR 1.945 SNIP 1.142 CiteScore 4.15
Scopus rating (2011): SJR 2.369 SNIP 1.23 CiteScore 4.58
Scopus rating (2010): SJR 2.631 SNIP 1.161
Scopus rating (2009): SJR 2.473 SNIP 0.985
Scopus rating (2008): SJR 2.323 SNIP 0.96
Scopus rating (2007): SJR 1.289 SNIP 0.525
Original language: English
ASJC Scopus subject areas: Agricultural and Biological Sciences(all), Biochemistry, Genetics and Molecular Biology(all), Medicine(all)
DOIs:
10.1371/journal.pone.0128954
Links:
http://www.scopus.com/inward/record.url?scp=84935462119&partnerID=8YFLogxK (Link to publication in Scopus)
Source: Scopus
Source-ID: 84935462119
Research output: Scientific - peer-review › Article

Fluctuations of Hi-Hat Timing and Dynamics in a Virtuoso Drum Track of a Popular Music Recording

Long-range correlated temporal fluctuations in the beats of musical rhythms are an inevitable consequence of human action. According to recent studies, such fluctuations also lead to a favored listening experience. The scaling laws of
amplitude variations in rhythms, however, are widely unknown. Here we use highly sensitive onset detection and time series analysis to study the amplitude and temporal fluctuations of Jeff Porcaro's one-handed hi-hat pattern in "I Keep Forgettin'"—one of the most renowned 16th note patterns in modern drumming. We show that fluctuations of hi-hat amplitudes and interbeat intervals (times between hits) have clear long-range correlations and short-range anticorrelations separated by a characteristic time scale. In addition, we detect subtle features in Porcaro's drumming such as small drifts in the 16th note pulse and non-trivial periodic two-bar patterns in both hi-hat amplitudes and intervals. Through this investigation we introduce a step towards statistical studies of the 20th and 21st century music recordings in the framework of complex systems. Our analysis has direct applications to the development of drum machines and to drumming pedagogy.

**General information**

State: Published

Ministry of Education publication type: A1 Journal article-refereed

Organisations: Research group: Quantum Control and Dynamics, Research area: Computational Physics, Department of Physics, Department of Signal Processing, Research group: Audio research group, Computational Science X (CompX), Signal Processing Research Community (SPRC), Regensburg Univ Appl Sci, University of Regensburg, Electroacoust Lab, Harvard Univ, Harvard University, Dept Phys, Max Planck Inst Dynam & Self Org MPI DS Gottingen, Max Planck Society

Authors: Räsänen, E., Pulkkinen, O., Virtanen, T., Zollner, M., Hennig, H.

Number of pages: 16

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Peer-reviewed: Yes

**Publication information**

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Article number: 0127902

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Scopus rating (2015): SJR 1.414 SNIP 1.131 CiteScore 3.32

Scopus rating (2014): SJR 1.545 SNIP 1.141 CiteScore 3.54

Scopus rating (2013): SJR 1.74 SNIP 1.147 CiteScore 3.94

Scopus rating (2012): SJR 1.945 SNIP 1.142 CiteScore 4.15

Scopus rating (2011): SJR 2.369 SNIP 1.23 CiteScore 4.58

Scopus rating (2010): SJR 2.631 SNIP 1.161

Scopus rating (2009): SJR 2.473 SNIP 0.985

Scopus rating (2008): SJR 2.323 SNIP 0.96

Scopus rating (2007): SJR 1.289 SNIP 0.525

Original language: English

Keywords: LONG-RANGE CORRELATIONS, TIME-SERIES, SENSORIMOTOR SYNCHRONIZATION, RATE-VARIABILITY, 1/F NOISE, GROOVE, PERFORMANCE, HEARTBEAT, RHYTHMS, ORGANIZATION

DOIs:

10.1371/journal.pone.0127902

**Bibliographical note**

ORG=fys,0.75

ORG=sgn,0.25

Source: WOS

Source-ID: 000355700700077

Research output: Scientific - peer-review › Article

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**Q-switched Nd:YVO4 microchip laser emitting 204 ps pulses at 1.34 µm**

We report a pulsed 1.34 µm Nd:YVO4 microchip laser Q-switched with a GaInNAs/GaAs semiconductor saturable absorber mirror. Output power of 24 mW at a repetition rate of 2.3 MHz and pulse duration of 204 ps was achieved, which is to our knowledge, the first demonstration of a 1.34 µm microchip laser utilizing this type of quantum well absorber.

**General information**

State: Published

Ministry of Education publication type: A4 Article in a conference publication

Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications

Authors: Nikkinen, J., Korpijärvi, V., Leino, I., Härkönen, A., Guina, M.
Dual-Mode Behavior in Multi-Section DFB Semiconductor Lasers with Laterally-Coupled Ridge-Waveguide Surface Gratings

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Research group: Nanophotonics
Authors: Uusitalo, T., Virtanen, H., Viheriälä, J., Salmi, J. O., Aho, A., Dumitrescu, M.
Publication date: Jun 2015

Optimization of High-Power Narrow-Linewidth Lasers for Space Applications

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications
Authors: Virtanen, H., Uusitalo, T., Dumitrescu, M.
Publication date: Jun 2015

Boundary Integral Operators in Linear and Second-order Nonlinear Nano-optics
Recent advances in the fabrication of nanoscale structures have enabled the production of almost arbitrarily shaped nanoparticles and so-called optical metamaterials. Such materials can be designed to have optical properties not found in nature, such as negative index of refraction. Noble metal nanostructures can enhance the local electric field, which is beneficial for nonlinear optical effects. The study of nonlinear optical properties of nanostructures and metamaterials is becoming increasingly important due to their possible uses in nanoscale optical switches, frequency converters and many other devices.

The responses of nanostructures depend heavily on their geometry, which calls for versatile modeling methods. In this work, we develop a boundary element method for the modeling of surface second-harmonic generation from isolated nanoparticles of very general shape. The method is also capable of modeling spatially periodic structures by the use of appropriate Green’s function. We further show how to utilize geometrical symmetries to lower the computational time and memory requirements in the boundary element method even in cases where the incident field is not symmetrical.

We validate the boundary element approach by the calculation of second-harmonic scattering from gold spheres of different radii. Comparison to analytical solution reveals that under one percent relative error is easily achieved. The method is then applied to model second-harmonic microscopy of single gold nanodots and second-harmonic generation from arrays of L- and T-shaped gold particles. The agreement between the calculations and measurements is shown to be excellent.

To provide a more intuitive understanding of the optical response of nanostructures, we develop a full-wave spectral approach, which is based on boundary integral operators. We present a theory which proves that the resonances of a
smooth scatterer are isolated poles that occur at complex frequencies. Other types of singularities, such as branch-cuts, may occur only via the fundamental Green function or material dispersion. We propose a definition of an eigenvalue problem at fixed real frequencies which gives rise to modes defined over the surface of the scatterer. We illustrate that these modes accurately describe the optical responses that are usually seen for certain particle shapes when using plane-wave excitations. With the spectral approach, the resonance frequencies and the modal responses of a scatterer can be found as intrinsic properties independent of any incident field. We show that the spectral theory is compatible with the Mie theory for spherical particles and with a previously studied quasi-static theory in the limit of zero frequency.

Emergent rogue wave structures and statistics in spontaneous modulation instability

The nonlinear Schrödinger equation (NLSE) is a seminal equation of nonlinear physics describing wave packet evolution in weakly-nonlinear dispersive media. The NLSE is especially important in understanding how high amplitude "rogue waves" emerge from noise through the process of modulation instability (MI) whereby a perturbation on an initial plane wave can evolve into strongly-localised "breather" or "soliton on finite background (SFB)" structures. Although there has been much study of such structures excited under controlled conditions, there remains the open question of how closely the analytic solutions of the NLSE actually model localised structures emerging in noise-seeded MI. We address this question here using numerical simulations to compare the properties of a large ensemble of emergent peaks in noise-seeded MI with the known analytic solutions of the NLSE. Our results show that both elementary breather and higher-order SFB structures are observed in chaotic MI, with the characteristics of the noise-induced peaks clustering closely around analytic NLSE predictions. A significant conclusion of our work is to suggest that the widely-held view that the Peregrine soliton forms a rogue wave prototype must be revisited. Rather, we confirm earlier suggestions that NLSE rogue waves are most appropriately identified as collisions between elementary SFB solutions.

General information
State: Published
Ministry of Education publication type: G5 Doctoral dissertation (article)
Organisations: Department of Physics, Research area: Optics
Authors: Mäkitalo, J.
Number of pages: 73
Publication date: 29 May 2015

Publication information
Publisher: Tampere University of Technology
Original language: English

Publication series
Name: Tampere University of Technology. Publication
Publisher: Tampere University of Technology
Volume: 1297
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Bibliographical note
Awarding institution: Tampere University of Technology
Versio ok 16.12.2015
Research output: Collection of articles › Doctoral Thesis

Emergent rogue wave structures and statistics in spontaneous modulation instability

The nonlinear Schrödinger equation (NLSE) is a seminal equation of nonlinear physics describing wave packet evolution in weakly-nonlinear dispersive media. The NLSE is especially important in understanding how high amplitude "rogue waves" emerge from noise through the process of modulation instability (MI) whereby a perturbation on an initial plane wave can evolve into strongly-localised "breather" or "soliton on finite background (SFB)" structures. Although there has been much study of such structures excited under controlled conditions, there remains the open question of how closely the analytic solutions of the NLSE actually model localised structures emerging in noise-seeded MI. We address this question here using numerical simulations to compare the properties of a large ensemble of emergent peaks in noise-seeded MI with the known analytic solutions of the NLSE. Our results show that both elementary breather and higher-order SFB structures are observed in chaotic MI, with the characteristics of the noise-induced peaks clustering closely around analytic NLSE predictions. A significant conclusion of our work is to suggest that the widely-held view that the Peregrine soliton forms a rogue wave prototype must be revisited. Rather, we confirm earlier suggestions that NLSE rogue waves are most appropriately identified as collisions between elementary SFB solutions.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research group: Nonlinear Fiber Optics, Frontier Photonics, The University of Auckland, School of Mathematical Sciences, University College Dublin, Institut FEMTO-ST, Université de Franche-Comté
Authors: Toenger, S., Godin, T., Billet, C., Dias, F., Erkintalo, M., Genty, G., Dudley, J. M.
Publication date: 20 May 2015
Peer-reviewed: Yes

Publication information
Journal: Scientific Reports
Volume: 5
Article number: 10380
ISSN (Print): 2045-2322
Ratings:
We demonstrate a 1.44-μm bismuth-doped master oscillator-power amplifier (MOPA) system for generating femtosecond pulses. The cavity of master oscillator comprises dispersion-compensating fiber for detuning the total dispersion to the normal regime and a carbon nanotube saturable absorber for triggering the mode-locked operation. The described multifunction bismuth fiber amplifier performs energy scaling, large spectral broadening, and pulse compression. The results show that the large chirp superimposed on the pulses in the bismuth oscillator with normal dispersion can be effectively suppressed in a subsequent bismuth power amplifier with anomalous dispersion and high nonlinearity, resulting in high-quality pulses with record duration of 240 fs. An all-fiber design provides a practical solution that avoids the need for supplementary pulse stretching and compression. (C) 2015 Optical Society of America
Imaging of alpha emitters in a field environment

Cameras sensitive to ultraviolet light can be applied to detection of surface contamination induced by alpha particle emitters. When absorbed in air, alpha particles excite nitrogen molecules and the radiative relaxation creates a faint light emission. This radioluminescence can be used for detection purposes, provided that background lighting levels are low. In this work, three low light sensitive camera technologies (CCD, EMCCD and ICCD) were utilized in a nuclear facility, and their performance in detecting alpha emitters was investigated. The results show that low readout noise is essential for the detection of radioluminescence, as it allows short exposure times to be used. The ICCD camera was found to perform slightly better than the EMCCD camera in the field, while both enable the detection of MBq level alpha activities in 100 s in the Lest configuration (camera target distance 0.5 m). Overall, the cameras and techniques used in this study are shown to be effective in defecting alpha emitters in a standard glovebox. This technology can be applied to nuclear security, safety and safeguards, when stand off defection of alpha emitters is required. (C) 2015 Elsevier B.V. All rights reserved,
**Dynamics of rogue wave and soliton emergence in spontaneous modulation instability**

Numerical simulations of spontaneous modulation instability show that localized structures in the chaotic instability field are well-described by analytic elementary and higher order soliton on finite background solutions of the nonlinear Schrödinger equation.

**Sec14-nodulin proteins and the patterning of phosphoinositide landmarks for developmental control of membrane morphogenesis**

Polarized membrane morphogenesis is a fundamental activity of eukaryotic cells. This process is essential for the biology of cells and tissues, and its execution demands exquisite temporal coordination of functionally diverse membrane signaling reactions with high spatial resolution. Moreover, mechanisms must exist to establish and preserve such organization in the face of randomizing forces that would diffuse it. Here we identify the conserved AtSfh1 Sec14-nodulin protein as a novel effector of phosphoinositide signaling in the extreme polarized membrane growth program exhibited by growing Arabidopsis root hairs. The data are consistent with Sec14-nodulin proteins controlling the lateral organization of phosphatidylinositol 4,5-bisphosphate (PtdIns(4,5)P₂) landmarks for polarized membrane morphogenesis in plants. This patterning activity requires both the PtdIns(4,5)P₂ binding and homo-oligomerization activities of the AtSfh1 nodulin domain and is an essential aspect of the polarity signaling program in root hairs. Finally, the data suggest a general principle for how the phosphoinositide signaling landscape is physically bit mapped so that eukaryotic cells are able to convert a membrane surface into a high-definition lipid-signaling screen.
Spontaneous four-wave mixing in liquid-core fibers: Towards fibered Raman-free correlated photon sources

We experimentally demonstrate, for the first time to our knowledge, the generation of correlated photon pairs in a liquid-core photonic crystal fiber. Moreover, we show that, thanks to the specific Raman properties of liquids, the Raman noise (which is the main limitation of the performance of silica-core fiber-based correlated photon pair sources) is highly reduced. With a demonstrated coincident-to-accidental ratio equal to 63 and a pair generation efficiency of about $10^{-4}$ per pump pulse, this work contributes to the development of high-quality correlated photon pair sources for quantum communications.
Role of subunit III and its lipids in the molecular mechanism of cytochrome c oxidase

The terminal respiratory enzyme cytochrome c oxidase (CcO) reduces molecular oxygen to water, and pumps protons across the inner mitochondrial membrane, or the plasma membrane of bacteria. A two-subunit CcO harbors all the elements necessary for oxygen reduction and proton pumping. However, it rapidly undergoes turnover-induced irreversible damage, which is effectively prevented by the presence of subunit III and its tightly bound lipids. We have performed classical atomistic molecular dynamics (MD) simulations on a three-subunit CcO, which show the formation of water wires between the polar head groups of lipid molecules bound to subunit III and the proton uptake site Asp91 (Bos taurus enzyme numbering). Continuum electrostatic calculations suggest that these lipids directly influence the proton affinity of Asp91 by 1-2 pK units. We surmise that lipids bound to subunit III influence the rate of proton uptake through the D-pathway, and therefore play a key role in preventing turnover-induced inactivation. Atomistic MD simulations show that subunit III is rapidly hydrated in the absence of internally bound lipids, which is likely to affect the rate of O$_2$ diffusion into the active-site. The role of subunit III with its indigenous lipids in the molecular mechanism of CcO is discussed.

General information

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Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research area: Computational Physics, Tampere University of Technology, Research group: Biological Physics and Soft Matter, Computational Science X (CompX), University of Southern Denmark, Institute of Molecular Biotechnology, Jena, Germany, Helsinki Bioenergetics Group, University of Helsinki Institute of Biotechnology
Authors: Sharma, V., Ala-Vannesluoma, P., Vattulainen, I., Wikström, M., Rög, T.
Number of pages: 8
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Volume: 1847
Issue number: 8
ISSN (Print): 0005-2728
Ratings:
Nanoparticle (particles with diameter ≤100 nm) exposure is recognized as a potentially harmful size fraction for pulmonary particle exposure. During nanoparticle synthesis, the number concentrations in the process room may exceed $10 \times 10^6$ cm$^{-3}$. During such conditions, it is essential that the occupants in the room wear highly reliable high-performance respirators to prevent inhalation exposure. Here we have studied the in-use program protection factor (PPF) of loose-fitting powered air purifying respirators, while workers were coating components with TiO$_2$ or Cu$_x$O$_y$ nanoparticles under a hood using a liquid flame spray process. The PPF was measured using condensation particle counters, an electrical low pressure impactor, and diffusion chargers. The room particle concentrations varied from $4 \times 10^6$ to $40 \times 10^6$ cm$^{-3}$, and the count median aerodynamic diameter ranged from 32 to 180 nm. Concentrations inside the respirator varied from 0.7 to 7.2 cm$^{-3}$. However, on average, tidal breathing was assumed to increase the respirator concentration by 2.3 cm$^{-3}$ times the respirator assigned protection factor. We were unable to measure clear differences in the PPF of respirators with old and new filters, among two male and one female user, or assess most penetrating particle size. This study shows that the loose-fitting powered air purifying respirator provides very efficient protection against nanoparticle inhalation exposure if used properly.
Aging scaled Brownian motion

Scaled Brownian motion (SBM) is widely used to model anomalous diffusion of passive tracers in complex and biological systems. It is a highly nonstationary process governed by the Langevin equation for Brownian motion, however, with a power-law time dependence of the noise strength. Here we study the aging properties of SBM for both unconfined and confined motion. Specifically, we derive the ensemble and time averaged mean squared displacements and analyze their behavior in the regimes of weak, intermediate, and strong aging. A very rich behavior is revealed for confined aging SBM depending on different aging times and whether the process is sub- or superdiffusive. We demonstrate that the information on the aging factorizes with respect to the lag time and exhibits a functional form that is identical to the aging behavior of scale-free continuous time random walk processes. While SBM exhibits a disparity between ensemble and time averaged observables and is thus weakly nonergodic, strong aging is shown to effect a convergence of the ensemble and time averaged mean squared displacement. Finally, we derive the density of first passage times in the semi-infinite domain that features a crossover defined by the aging time.

General information
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Organisations: Department of Physics, Research area: Computational Physics, Max-Planck Institute for the Physics of Complex Systems, Institute for Physics and Astronomy, University of Potsdam, Nordic Institute for Theoretical Physics NORDITA, Shahid Beheshti University, Kharkov Institute of Physics and Technology
Authors: Safdari, H., Chechkin, A. V., Jafari, G. R., Metzler, R.
Publication date: 7 Apr 2015
Peer-reviewed: Yes

Publication information
Journal: Physical Review E
Volume: 91
Conformational properties of complex polymers: Rosette versus star-like structures

Multiple loop formation in polymer macromolecules is an important feature of the chromatin organization and DNA compactification in the nuclei. We analyse the size and shape characteristics of complex polymer structures, containing in general $f_1$ loops (petals) and $f_2$ linear chains (branches). Within the frames of continuous model of Gaussian macromolecule, we apply the path integration method and obtain the estimates for gyration radius $R_g$ and asphericity $\Delta$ of typical conformation as functions of parameters $f_1$, $f_2$, and $g$. In particular, our results qualitatively reveal the extent of anisotropy of star-like topologies as compared to the rosette structures of the same total molecular weight.

General information

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Organisations: Department of Physics, Institute for Physics and Astronomy, University of Potsdam, Institute for Condensed Matter Physics, National Academy of Sciences of Ukraine
Authors: Blavatska, V., Metzler, R.
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Scopus rating (2014): SJR 0.92 SNIP 0.918 CiteScore 1.36
N-Glycosylation as determinant of epidermal growth factor receptor conformation in membranes

The epidermal growth factor receptor (EGFR) regulates several critical cellular processes and is an important target for cancer therapy. In lieu of a crystallographic structure of the complete receptor, atomistic molecular dynamics (MD) simulations have recently shown that they can excel in studies of the full-length receptor. Here we present atomistic MD simulations of the monomeric N-glycosylated human EGFR in biomimetic lipid bilayers that are, in parallel, also used for the reconstitution of full-length receptors. This combination enabled us to experimentally validate our simulations, using ligand binding assays and antibodies to monitor the conformational properties of the receptor reconstituted into membranes. We find that N-glycosylation is a critical determinant of EGFR conformation, and specifically the orientation of the EGFR ectodomain relative to the membrane. In the absence of a structure for full-length, posttranslationally modified membrane receptors, our approach offers new means to structurally define and experimentally validate functional properties of cell surface receptors in biomimetic membrane environments.

General information

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Organisations: Department of Physics, Tampere University of Technology, Research area: Computational Physics, Research group: Biological Physics and Soft Matter, Computational Science X (CompX), University of Southern Denmark, Paul Langerhans Institute Dresden of the Helmholtz Centre Munich, University Clinic Carl Gustav Carus, TU Dresden, German Center for Diabetes Research (DZD e.V.), Max Planck Institute for Molecular Cell Biology and Genetics
Authors: Kaszuba, K., Grzybek, M., Orłowski, A., Danne, R., Rög, T., Simons, K., Coskun, Ü., Vattulainen, I.
Number of pages: 6
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Scopus rating (2015): SJR 6.767 SNIP 2.682 CiteScore 8.84
Oxidation of cholesterol does not alter significantly its uptake into high-density lipoprotein particles

Using replica exchange umbrella sampling we calculated free energy profiles for uptake of cholesterol and one of its oxysterols (7-ketocholesterol) from an aqueous solution into a high-density lipoprotein particle. These atomistic molecular dynamics simulations show that both sterols are readily taken up from the aqueous solution with comparable free energy minima at the surface of the particle of -17 kcal/mol for cholesterol and -14 kcal/mol for 7-ketocholesterol. Moreover, given its preferred position at the particle surface, 7-ketocholesterol is expected to be able to participate directly in biological signaling processes.
193-GHz 53-W Subpicosecond Pulse Source

We present a light source that can generate a pulse train with an extremely high repetition rate, tens of watts of average output power, and a low-divergence output beam. This unique combination of system characteristics is achieved with single-stage amplification of a passively harmonically mode-locked semiconductor disk laser in a tapered Yb-doped double-clad fiber. With the short-length tapered fiber amplifier an amplification factor >17 dB is reached, while preserving the 930-fs pulse duration of the semiconductor disk laser. The demonstrated pulse source with a beam quality factor
Broadband infrared continuum generation in dispersion shifted tapered fiber

Experimental and theoretical studies of supercontinuum generation in the telecom spectral window are reported for fibers with shifted decreasing anomalous dispersion. Numerical analysis highlights the high average power of the emitted dispersive waves and the good spectral flatness achieved within the control spectral band for the supercontinuum generated in optical fiber tapers. Reduction of the third-order dispersion in optical fiber tapers is shown to cause spectral broadening, which is extended by hundreds of nanometers in comparison with the supercontinuum generated in uniform fibers, even when subpicosecond pulses of moderate powers are used.

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Organisations: Optoelectronics Research Centre, Research group: Ultrafast and intense lasers, Tampere University of Technology, Ulyanovsk State University, Prokhorov General Physics Institute, Russian Academy of Sciences
Authors: Korobko, D. A., Okhotnikov, O. G., Stoliarov, D. A., Sysolyatin, A. A., Zolotovskii, I. O.
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Scopus rating (2014): SJR 1.188 SNIP 1.156 CiteScore 2.09
Scopus rating (2013): SJR 1.354 SNIP 1.281 CiteScore 2.33
Scopus rating (2012): SJR 1.517 SNIP 1.273 CiteScore 2.2
Scopus rating (2011): SJR 1.527 SNIP 1.495 CiteScore 2.33
Scopus rating (2010): SJR 1.47 SNIP 1.356
Scopus rating (2009): SJR 1.763 SNIP 1.59
Scopus rating (2008): SJR 1.645 SNIP 1.33
Scopus rating (2007): SJR 1.737 SNIP 1.29
Scopus rating (2006): SJR 1.644 SNIP 1.411
Scopus rating (2005): SJR 2.071 SNIP 1.686
Scopus rating (2004): SJR 1.974 SNIP 1.626
Scopus rating (2003): SJR 1.742 SNIP 1.414
Scopus rating (2002): SJR 1.754 SNIP 1.406
Scopus rating (2001): SJR 1.809 SNIP 1.394
Scopus rating (2000): SJR 1.778 SNIP 1.131
Scopus rating (1999): SJR 1.976 SNIP 1.161
Controlled high-fidelity navigation in the charge stability diagram of a double quantum dot

We propose an efficient control protocol for charge transfer in a double quantum dot. We consider numerically a two-dimensional model system, where the quantum dots are subjected to time-dependent electric fields corresponding to experimental gate voltages. Our protocol enables navigation in the charge stability diagram from a state to another through controllable variation of the fields. We show that the well-known adiabatic Landau-Zener transition—when supplemented with a time-dependent field tailored with optimal control theory—can remarkably improve the transition speed. The results also lead to a simple control scheme obtained from the experimental charge stability diagram that requires only a single parameter. Eventually, we can achieve the ultrafast performance of the composite pulse protocol that allows the system to be driven at the quantum speed limit.
Monolithic GaInNAsSb/GaAs VECSEL Operating at 1550 nm

The first monolithic GaAs-based vertical-external-cavity surface-emitting laser (VECSEL) operating at 1550 nm is reported. The VECSEL operation is based on a gain mirror which was grown in a single growth run by plasma-assisted molecular beam epitaxy. The gain mirror comprised eight GaInNAsSb/GaAs quantum wells with a photoluminescence peak at 1505 nm and an AlAs/GaAs distributed Bragg reflector ensuring high reflectivity. The VECSEL chip was pumped with an 808-nm diode laser that had a large quantum defect in respect to the lasing wavelength. An output power of 80 mW in continuous wave mode and 210 mW in pulsed pump mode are demonstrated close to room temperature.

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Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Frontier Photonics
Authors: Korpijärvi, V., Kantola, E. L., Leinonen, T., Isoaho, R., Guina, M.
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Scopus rating (2014): SJR 1.889 SNIP 2.072 CiteScore 3.49
Scopus rating (2013): SJR 2.258 SNIP 2.38 CiteScore 4.55
Scopus rating (2012): SJR 2.742 SNIP 2.661 CiteScore 4.35
Scopus rating (2011): SJR 2.367 SNIP 2.845 CiteScore 3.87
Scopus rating (2010): SJR 2.217 SNIP 2.599
Scopus rating (2009): SJR 2.964 SNIP 2.869
Scopus rating (2008): SJR 2.476 SNIP 2.433
Scopus rating (2007): SJR 2.428 SNIP 1.746
Scopus rating (2006): SJR 2.131 SNIP 2.383
Scopus rating (2005): SJR 2.93 SNIP 2.594
Scopus rating (2004): SJR 2.827 SNIP 2.62
Scopus rating (2003): SJR 3.121 SNIP 3.103
Scopus rating (2002): SJR 2.664 SNIP 2.508
Scopus rating (2001): SJR 2.25 SNIP 1.926
Scopus rating (2000): SJR 2.37 SNIP 1.335
Scopus rating (1999): SJR 3.466 SNIP 1.611
Original language: English
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Bibliographical note
AUX=orc,"Isoaho, Riku"

Scaling the Power and Tailoring the Wavelength of Semiconductor Disk Lasers

Optically pumped semiconductor disk lasers (SDLs) provide a unique combination of high output power, high beam quality and possible emission wavelengths spanning from the ultraviolet to the mid-infrared spectral range. In essence, SDLs combine the wavelength versatility of semiconductor gain media with the power scaling principles of optically pumped solid state disk lasers. The emission wavelength of SDLs can be tailored to match the desired application simply by altering the composition of the gain material. High power operation, however, requires efficient thermal management, which can be realized using thin structures that are integrated with industrial diamond heat spreaders. The main objective of this thesis
was to develop methods for increasing the output power of optically pumped SDLs, especially in challenging wavelength regions. The work included integrating SDL gain elements onto diamond heat spreaders using thin intermediate gold layers. This configuration enabled 45–50% higher output powers than conventional bonding with indium solder. In addition, the reflectivity of the SDL gain mirror was enhanced using a semiconductor-dielectric-metal compound mirror. This procedure enabled 30% thinner mirror structures when compared with the conventional design, where the reflectivity of the semiconductor mirror is enhanced with a metal layer. Finally, thin GaAs-based semiconductor mirrors were integrated with InP-based active regions. Such integration is necessary for high power operation in the spectral range 1.3–1.6 µm, because InP-based compounds for a highly reflective thin mirror section are not available. The configuration enabled record-high output powers of 6.6 W and 4.6 W at the wavelengths of 1.3 µm and 1.58 µm, respectively. The second objective of this thesis was to generate high output powers in single-frequency operation and via intracavity frequency-doubling. In single-frequency operation, record-high output powers of 4.6 W and 1 W were demonstrated at the wavelengths of 1.06 µm and 1.56 µm, respectively. Such light sources are required for numerous applications including free-space communications and high resolution spectroscopy. In addition, second-harmonic generation was demonstrated with SDLs emitting at 1.3 µm and 1.57 µm. The output powers reached 3 W at 650 nm and 1 W at 785 nm, which represent record-high output powers from SDLs in this wavelength range. These types of lasers could be especially useful in biophotonics and medical applications.

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Authors: Rantamäki, A.
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Rantamaki.pdf: 2583464 bytes, checksum: 6137b49021cc64e7f104548211bc8b5 (MD5)
Source: researchoutputwizard
Source-ID: 123456789/22842
Research output: Collection of articles › Doctoral Thesis

Dilute nitride SOAs for high-speed data processing in variable temperature conditions
We present the first experimental study of a Dilute Nitride SOA with high-speed gain dynamics and attractive thermal characteristics as a data processing element at 10Gb/s and at different operating temperatures.

General information
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Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Frontier Photonics, Aristotle University of Thessaloniki, School of Electrical and Computer Engineering, National Technical University of Athens
Perfect magnetic mirror and simple perfect absorber in the visible spectrum

Known experimental artificial magnetic conductors for terahertz and optical frequencies are formed by arrays of nanoparticles of various shapes. In this paper, we show that artificial magnetic conductors for the visible spectrum can be realized as simple, effectively quasistatic resonating structures, where the effective inductance is due to the magnetic flux inside a uniform metal substrate, and the effective capacitance is due to electric polarization of a thin uniform dielectric cover. To illustrate the main potential application of artificial magnetic conductors, we concentrate on the perfect-absorption regime, achieved by adjusting the loss factor of the artificial magnetic conductor to match its real input impedance to free space. We provide approximate analytical design formulas and introduce a simple equivalent circuit to explain the physical mechanism of emulation of magnetic response and perfect absorption of light. A prototype of a nearly perfect absorber for optical (from green to ultraviolet) frequencies is designed and experimentally tested. The results confirm the theoretical predictions and show polarization insensitivity and angular independence of response in a wide range of incidence angles.
Mode-locked Tm,Ho:KLu(WO4)2 laser at 2060 nm using InGaSb-based SESAMs

Passive mode-locking of a Tm,Ho:KLu(WO4)2 laser operating at 2060 nm using different designs of InGaAsSb quantum-well based semiconductor saturable absorber mirrors (SESAMs) is demonstrated. The self-starting mode-locked laser delivers pulse durations between 4 and 8 ps at a repetition rate of 93 MHz with maximum average output power of 155 mW. Mode-locking performance of a Tm,Ho:KLu(WO4)2 laser is compared for usage of a SESAM to a single-walled carbon nanotube saturable absorber.

General information
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Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Frontier Photonics, Campus Seselades, Max Born Institute, Sofia University St. Kliment Ohridski, Física i Cristallografia de Materials i Nanomaterials, Universitat Rovira i Virgili
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Scopus rating (2014): SJR 2.349 SNIP 2.166 CiteScore 4.18
Scopus rating (2013): SJR 2.358 SNIP 2.226 CiteScore 4.38
Scopus rating (2012): SJR 2.587 SNIP 2.145 CiteScore 3.85
Scopus rating (2011): SJR 2.579 SNIP 2.606 CiteScore 4.04
Scopus rating (2010): SJR 2.943 SNIP 2.466
Scopus rating (2009): SJR 3.092 SNIP 2.669
Scopus rating (2008): SJR 3.195 SNIP 2.393
Scopus rating (2007): SJR 3.27 SNIP 2.032
Scopus rating (2006): SJR 3.233 SNIP 2.326
Scopus rating (2005): SJR 3.334 SNIP 2.379
Scopus rating (2004): SJR 2.833 SNIP 2.499
Scopus rating (2003): SJR 2.688 SNIP 2.193
Scopus rating (2002): SJR 1.547 SNIP 1.673
Scopus rating (2001): SJR 1.442 SNIP 1.39
Scopus rating (2000): SJR 1.246 SNIP 0.714
Scopus rating (1999): SJR 1.381 SNIP 0.838

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ASJC Scopus subject areas: Atomic and Molecular Physics, and Optics
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Source: Scopus
Source-ID: 84924194860
Research output: Scientific - peer-review › Article
Polymer looping is controlled by macromolecular crowding, spatial confinement, and chain stiffness

We study by extensive computer simulations the looping characteristics of linear polymers with varying persistence length inside a spherical cavity in the presence of macromolecular crowding. For stiff chains, the looping probability and looping time reveal wildly oscillating patterns as functions of the chain length. The effects of crowding differ dramatically for flexible versus stiff polymers. While for flexible chains the looping kinetics is slowed down by the crowders, for stiffer chains the kinetics turns out to be either decreased or facilitated, depending on the polymer length. For severe confinement, the looping kinetics may become strongly facilitated by crowding. Our findings are of broad impact for DNA looping in the crowded and compartmentalized interior of living biological cells.

General information
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Organisations: Department of Physics, Institute for Physics and Astronomy, University of Potsdam, Max-Planck Institute for the Physics of Complex Systems
Authors: Shin, J., Cherstvy, A. G., Metzler, R.
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Scopus rating (2015): SJR 2.407 SNIP 1.427 CiteScore 5.91
Scopus rating (2014): SJR 2.484 SNIP 1.616 CiteScore 5.66
Scopus rating (2013): SJR 2.156 SNIP 1.24 CiteScore 5.15
Original language: English
DOIs: 10.1021/mz500709w
Links: http://www.scopus.com/inward/record.url?scp=84923204435&partnerID=8YFLogxK (Link to publication in Scopus)
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Research output: Scientific - peer-review › Article

Proton-coupled electron transfer and the role of water molecules in proton pumping by cytochrome c oxidase

Molecular oxygen acts as the terminal electron sink in the respiratory chains of aerobic organisms. Cytochrome c oxidase in the inner membrane of mitochondria and the plasma membrane of bacteria catalyzes the reduction of oxygen to water, and couples the free energy of the reaction to proton pumping across the membrane. The proton-pumping activity contributes to the proton electrochemical gradient, which drives the synthesis of ATP. Based on kinetic experiments on the O-O bond splitting transition of the catalytic cycle (A → PR), it has been proposed that the electron transfer to the binuclear iron-copper center of O2 reduction initiates the proton pump mechanism. This key electron transfer event is coupled to an internal proton transfer from a conserved glutamic acid to the proton-loading site of the pump. However, the proton may instead be transferred to the binuclear center to complete the oxygen reduction chemistry, which would constitute a short-circuit. Based on atomistic molecular dynamics simulations of cytochrome c oxidase in an explicit membrane-solvent environment, complemented by related free-energy calculations, we propose that this short-circuit is effectively prevented by a redoxstate-dependent organization of water molecules within the protein structure that gates the proton transfer pathway. cell respiration , atomistic molecular dynamics simulations , functional water molecules ,free-energy calculations 

General information
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Organisations: Department of Physics, Research group: Biological Physics and Soft Matter, Computational Science X (CompX), University of Southern Denmark, Programme for Structural Biology and Biophysics, University of Helsinki Institute of Biotechnology
Authors: Sharma, V., Enkavi, G., Vattulainen, I., Rög, T., Wikström, M.
Second-harmonic generation imaging of semiconductor nanowires with focused vector beams

We use second-harmonic generation (SHG) with focused vector beams to investigate individual vertically aligned GaAs nanowires. Our results provide direct evidence that SHG from oriented nanowires is mainly driven by the longitudinal field along the nanowire growth axis. Consequently, focused radial polarization provides a superior tool to characterize such nanowires compared to linear polarization, also allowing this possibility in the native growth environment. We model our experiments by describing the SHG process for zinc-blende structure and dipolar bulk nonlinearity.
Real-space Wigner-Seitz Cells Imaging of Potassium on Graphite via Elastic Atomic Manipulation

Atomic manipulation in the scanning tunnelling microscopy, conventionally a tool to build nanostructures one atom at a time, is here employed to enable the atomic-scale imaging of a model low-dimensional system. Specifically, we use low-temperature STM to investigate an ultra thin film (4 atomic layers) of potassium created by epitaxial growth on a graphite substrate. The STM images display an unexpected honeycomb feature, which corresponds to a real-space visualization of the Wigner-Seitz cells of the close-packed surface K atoms. Density functional simulations indicate that this behaviour arises from the elastic, tip-induced vertical manipulation of potassium atoms during imaging, i.e. elastic atomic manipulation, and reflects the ultrasoft properties of the surface under strain. The method may be generally applicable to other soft e.g. molecular or biomolecular systems.

General information

State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research group: Materials and Molecular Modeling, Computational Science X (CompX), Univ Birmingham, University of Birmingham, Sch Phys & Astron, Nanoscale Phys Res Lab, Shaanxi Normal Univ, Shaanxi Normal University, Sch Phys & Informat Technol, Univ Jyvaskyla, University of Jyvaskyla, Dept Phys, Nanosci Ctr, Aalto Univ, Aalto University, Sch Sci, COMP Ctr Excellence, Dept Appl Phys
Authors: Yin, F., Koskinen, P., Kujju, S., Akola, J., Palmer, R. E.
Number of pages: 5
Publication date: 5 Feb 2015
Peer-reviewed: Yes

Publication information
Journal: Scientific Reports
Volume: 5
Article number: 8276
Spatial optical solitons in highly nonlocal media

We theoretically investigate the propagation of bright spatial solitary waves in highly nonlocal media possessing radial symmetry in a three-dimensional cylindrical geometry. Focusing on a thermal nonlinearity, modeled by a Poisson equation, we show how the profile of the light-induced waveguide strongly depends on the extension of the nonlinear medium in the propagation direction as compared to the beamwidth. We demonstrate that self-trapped beams undergo oscillations in size, either periodically or aperiodically, depending on the input waist and power. The-usually neglected-role of the longitudinal nonlocality as well as the detrimental effect of absorptive losses are addressed.

General information

State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research group: Nonlinear Optics, Frontier Photonics, Univ Porto, Universidade do Porto, Fac Ciencias, Ctr Fis Porto, Univ Edinburgh, University of Edinburgh, Sch Math, Univ Roma Tre, Roma Tre University, NooEL Nonlinear Opt & OptoElect Lab
Authors: Alberucci, A., Jisha, C. P., Smyth, N. F., Assanto, G.
Number of pages: 10
Publication date: 27 Jan 2015
Peer-reviewed: Yes

Publication information

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Scopus rating (2015): SJR 1.451 SNIP 0.903 CiteScore 2.06
Scopus rating (2014): SJR 2.121 SNIP 1.146 CiteScore 2.46
Scopus rating (2013): SJR 2.317 SNIP 1.179 CiteScore 2.86
Scopus rating (2012): SJR 2.515 SNIP 1.239 CiteScore 2.81
Scopus rating (2011): SJR 2.31 SNIP 1.261 CiteScore 2.79
Scopus rating (2010): SJR 2.403 SNIP 1.22
Scopus rating (2009): SJR 2.475 SNIP 1.305
Scopus rating (2008): SJR 2.559 SNIP 1.241
Scopus rating (2007): SJR 2.618 SNIP 1.259
Scopus rating (2006): SJR 2.342 SNIP 1.257
Scopus rating (2005): SJR 2.017 SNIP 1.286
Scopus rating (2004): SJR 2.168 SNIP 1.1
Scopus rating (2003): SJR 2.05 SNIP 1.078
Scopus rating (2002): SJR 2.037 SNIP 1.191
Silver sulfide nanoclusters and the superatom model

The superatom model of electron-shell closings has been widely used to explain the stability of noble-metal nanoclusters of few nanometers, including thiolate-protected Au and Ag nanoclusters. The presence of core sulfur atoms in silver sulfide (Ag-S) nanoclusters renders them a class of clusters with distinctive properties as compared to typical noble-metal clusters. Here, it is natural to ask whether the superatom model is still applicable for the Ag-S nanoclusters with mixed metal and nonmetal core atoms. To address this question, we applied density functional simulations to analyze a series of Ag-S nanoclusters: Ag\textsubscript{14}S\text(SPh\textsubscript{12})(PPh\textsubscript{3})\textsubscript{12}, Ag\textsubscript{14}SC\textsubscript{6}H\textsubscript{3}F\textsubscript{2}\textsubscript{12}(PPh\textsubscript{3})\textsubscript{12}, Ag\textsubscript{70}S\textsubscript{16}(SPh\textsubscript{3})\textsubscript{34}(PhCO\textsubscript{2})\textsubscript{4}(triphos)\textsubscript{4}, and [Ag\textsubscript{123}S\textsubscript{35}(StBu\textsubscript{50})\textsuperscript{3+}]. We observed that superatomic orbitals are still present in the conduction band of these Ag-S clusters where the cluster cores comprise mostly silver atoms. Our Bader charge analysis illustrates that thiolates play a significant role in withdrawing charge (electron density) from the core Ag atoms. The simulated optical absorption properties of the selected Ag-S clusters reflect the substantial band gaps associated with typical molecular orbitals on both sides. Apart from Ag\textsubscript{14}S\text(SPh\textsubscript{12})(PPh\textsubscript{3})\textsubscript{12}, which has a central sulfur atom in the cluster core, superatomic orbitals of the Ag-S clusters can have contributions for individual transitions in the conduction band.

General information

State: Published
Organisations: Department of Physics, Research group: Materials and Molecular Modeling, Computational Science X (CompX), University of Jyväskylä, Departments of Physics and Chemistry
Authors: Goh, J., Malola, S., Häkkinen, H., Akola, J.
Number of pages: 8
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Volume: 119
Issue number: 3
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Scopus rating (2015): SJR 1.917 SNIP 1.268 CiteScore 4.68
Scopus rating (2014): SJR 2.027 SNIP 1.448 CiteScore 5.08
Scopus rating (2013): SJR 2.134 SNIP 1.439 CiteScore 5.14
Scopus rating (2012): SJR 2.514 SNIP 1.46 CiteScore 4.98
Scopus rating (2011): SJR 2.32 SNIP 1.457 CiteScore 4.92
Scopus rating (2010): SJR 2.438 SNIP 1.356
Scopus rating (2009): SJR 2.128 SNIP 1.417
Scopus rating (2008): SJR 1.856 SNIP 1.033
Original language: English
ASJC Scopus subject areas: Physical and Theoretical Chemistry, Electronic, Optical and Magnetic Materials, Surfaces, Coatings and Films, Energy(all)
DOI:
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http://www.scopus.com/inward/record.url?scp=84921476515&partnerID=8YFLogxK (Link to publication in Scopus)
Source: Scopus
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Research output: Scientific - peer-review › Article
Second-Harmonic Generation from Metal Nanoparticles: Resonance Enhancement versus Particle Geometry

We demonstrate that optical second-harmonic generation (SHG) from arrays of noncentrosymmetric gold nanoparticles depends essentially on particle geometry. We prepare nanoparticles with different geometrical shapes (L and T) but similar wavelengths for the polarization-dependent plasmon resonances. In contrast to recent interpretations emphasizing resonances at the fundamental frequency, the T shape leads to stronger SHG when only one, instead of both, polarization component of the fundamental field is resonant. This is explained by the character of plasmon oscillations supported by the two shapes. Our numerical simulations for both linear and second-order responses display unprecedented agreement with measurements.

Circular polarization switching and bistability in an optically injected 1300 nm spin-vertical cavity surface emitting laser

We report the experimental observation of circular polarization switching (PS) and polarization bistability (PB) in a 1300 nm dilute nitride spin-vertical cavity surface emitting laser (VCSEL). We demonstrate that the circularly polarized optical signal at 1300 nm can gradually or abruptly switch the polarization ellipticity of the spin-VCSEL from right-to-left circular
polarization and vice versa. Moreover, different forms of PS and PB between right- and left-circular polarizations are observed by controlling the injection strength and the initial wavelength detuning. These results obtained at the telecom wavelength of 1300 nm open the door for novel uses of spin-VCSELs in polarization sensitive applications in future optical systems.

**General information**

State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Frontier Photonics, Institute of Photonics, School of Computer Science and Electronic Engineering, University of Essex, University of Strathclyde
Publication date: 12 Jan 2015
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Ratings:
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Scopus rating (2015): SJR 1.085 SNIP 0.983 CiteScore 2.47
Scopus rating (2014): SJR 1.799 SNIP 1.462 CiteScore 3.25
Scopus rating (2013): SJR 2.149 SNIP 1.652 CiteScore 3.77
Scopus rating (2012): SJR 2.554 SNIP 1.754 CiteScore 3.76
Scopus rating (2011): SJR 2.805 SNIP 1.94 CiteScore 4.04
Scopus rating (2010): SJR 2.926 SNIP 1.789
Scopus rating (2009): SJR 2.857 SNIP 1.848
Scopus rating (2008): SJR 2.934 SNIP 1.83
Scopus rating (2007): SJR 3.039 SNIP 1.913
Scopus rating (2006): SJR 3.457 SNIP 2.288
Scopus rating (2005): SJR 3.709 SNIP 2.382
Scopus rating (2004): SJR 3.904 SNIP 2.38
Scopus rating (2003): SJR 3.765 SNIP 2.27
Scopus rating (2002): SJR 3.917 SNIP 2.365
Scopus rating (2001): SJR 4.111 SNIP 2.212
Scopus rating (2000): SJR 4.277 SNIP 2.013
Scopus rating (1999): SJR 4.35 SNIP 2.11
Original language: English
ASJC Scopus subject areas: Physics and Astronomy (miscellaneous)
DOIs: 10.1063/1.4905923
Source: Scopus
Source-ID: 84923899787
Research output: Scientific › peer-review › Article

**Compact intracavity singly-resonant optical parametric oscillator pumped by GaSb-based vertical external cavity surface-emitting laser: Concept and the main operational characteristics**

The concept of an intracavity singly-resonant optical parametric oscillator pumped by a GaSb-based vertical external cavity surface-emitting laser has been proposed. The steady-state characteristics of the parametric oscillator with the joint cavity shared by the pump and signal optical fields have been numerically analyzed. Using a few millimeter long orientation-patterned quasi-phase-matched GaAs nonlinear crystal in such a cavity allows fairly compact (~15-mm long) device working in the mid-infrared range (wavelength of 16.5 μm) to be built.

**General information**

State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Ultrafast and intense lasers, Russian Academy of Sciences, Kotelnikov Institute of Radio Engineering and Electronics, Saratov Branch, P.N. Lebedev Physical Institute, Russian Academy of Sciences
1180 nm CW VECSEL emitting 50 W

We report on the development of a high-power vertical-external-cavity surface-emitting laser (VECSEL) emitting around 1180 nm. The laser emitted 50 W of output power when the mount of the gain chip was cooled to -15°C. The output power was measured using a 97% reflective cavity end-mirror. The VECSEL was arranged to form an I-shaped cavity with a length of ~100 mm; the gain chip and a curved dielectric mirror (RoC=150) acting as cavity end mirrors. The gain chip was grown by molecular beam epitaxy (MBE) and incorporated 10 GaInAs/GaAs quantum wells. For efficient heat extraction, the chip was capillary bonded to a diamond heat spreader which was attached to a TEC-cooled copper mount. The maximum optical-to-optical conversion efficiency of 28% was achieved for 42 W of output power and -15°C mount temperature.

1180 nm VECSEL with 50 W output power

We report on the development of a high-power vertical-external-cavity surface-emitting laser (VECSEL) emitting around 1180 nm. The laser emitted 50 W of output power when the mount of the gain chip was cooled to -15°C. The output power was measured using a 97% reflective cavity end-mirror. The VECSEL was arranged to form an I-shaped cavity with a length of ~100 mm; the gain chip and a curved dielectric mirror (RoC=150) acting as cavity end mirrors. The gain chip was grown by molecular beam epitaxy (MBE) and incorporated 10 GaInAs/GaAs quantum wells. For efficient heat extraction, the chip was capillary bonded to a diamond heat spreader which was attached to a TEC-cooled copper mount. The maximum optical-to-optical conversion efficiency of 28% was achieved for 42 W of output power and -15°C mount temperature.
50 W VECSEL emitting at 1180 nm

We report a 50 W VECSEL emitting at 1180 nm. The gain chip was grown by MBE and TEC-cooled. The maximum power was measured for a mount temperature of -15°C.

Background-Free Second-Harmonic Generation Microscopy of Individual Carbon Nanotubes

Breathers Emergence in Spontaneous Modulation Instability
CBRN Defense Using THz Pulse Trains from Semiconductor Disk Lasers

We propose THz generation from a photoconductive antenna illuminated by a train of optical pulses with a pulse repetition rate that corresponds to the desired THz frequency. This new method of THz generation can be seen as a hybrid between the conventional optical THz generation methods, where the optical source is either a heterodyne signal from two continuous wave lasers or a single short pulse. Therefore, the method holds promise for generating both coherent broadband and narrow-linewidth continuous wave THz radiation. The high-repetition rate optical pulse train is obtained from a semiconductor disk laser harmonically mode-locked by a semiconductor saturable absorber mirror and an intracavity etalon. Optical pulse trains with pulse repetition rates from 190 GHz to 580 GHz are demonstrated at an average optical output power of 1 W. This power level is enough for driving full arrays of photoconductive antennas. The approach may provide a compact and powerful THz source for CBRN defense.

Depth-resolved nonlinear imaging with cylindrical vector beams

Detailed analysis of laser-induced breakdown spectroscopy of single particles using electrodynamic balance trapping
Detection of the relativistic electrons at atmosphere

**General information**

State: Published

Ministry of Education publication type: D3 Professional conference proceedings

Organisations: Department of Physics, Sodankylä Geophysical Observatory FIN-99600 Sodankylä Finland

Authors: Gholizadehkalkhoran, H., Turunen, E.

Publication date: 2015

**Host publication information**

Title of host publication: FINCOSPAR 2015

Links:

http://www.cospar.fi/fincospar2015/

Research output: Professional › Conference contribution

Enhancement mechanisms for second-harmonic generation from metal nanostructures

**General information**

State: Published

Ministry of Education publication type: B3 Non-refereed article in conference proceedings

Organisations: Department of Physics, Research area: Optics, Research group: Nonlinear Optics, Univ Eastern Finland, University of Eastern Finland, Inst Photon

Authors: Kauranen, M., Czaplicki, R., Mäkitalo, J., Lehtolahti, J., Koskinen, K., Laukkanen, J., Kuitinen, M.

Publication date: 2015

**Host publication information**

Title of host publication: PROCEEDINGS OF SPIE : Ultrafast Phenomena and Nanophotonics XX

Volume: 9746

ISBN (Electronic): 9781628419818

Research output: Scientific › Conference contribution

Enhancement Mechanisms for Second-order Nonlinear Metamaterials

**General information**

State: Published

Ministry of Education publication type: D3 Professional conference proceedings

Organisations: Department of Physics, Research area: Optics, Research group: Nonlinear Optics

Authors: Kauranen, M.

Publication date: 2015

**Host publication information**

Title of host publication: OSA Nonlinear Metamaterials Incubator

Links:

http://www.osa.org/en-us/nonlinearmetamaterials/ (Meeting www page)

Research output: Professional › Conference contribution

Experimental demonstration of temporal ghost imaging

We report on the first experimental demonstration of time-domain ghost imaging using different types of temporally incoherent light sources. Our results open novel perspectives for dynamic imaging of ultra-fast waveforms with high resolution.

**General information**

State: Published

Ministry of Education publication type: B3 Non-refereed article in conference proceedings

Organisations: Department of Physics, Research area: Optics, Research group: Nonlinear Fiber Optics
Experimental determination and computational interpretation of biophysical properties of lipid bilayers enriched by cholesteryl hemisuccinate

Cholesteryl hemisuccinate (CHS) is one of the cholesterol-mimicking detergents not observed in nature. It is, however, widely used in protein crystallography, in biochemical studies of proteins, and in pharmacology. Here, we performed an extensive experimental and theoretical study on the behavior of CHS in lipid membranes rich in unsaturated phospholipids. We found that the deprotonated form of CHS (that is the predominant form under physiological conditions) does not mimic cholesterol very well. The protonated form of CHS does better in this regard, but also its ability to mimic the physical effects of cholesterol on lipid membranes is limited. Overall, although ordering and condensing effects characteristic to cholesterol are present in systems containing any form of CHS, their strength is appreciably weaker compared to cholesterol. Based on the considerable amount of experimental and atomistic simulation data, we conclude that these differences originate from the fact that the ester group of CHS does not anchor it in an optimal position at the water-membrane interface. The implications of these findings for considerations of protein-cholesterol interactions are briefly discussed.
Extreme Nonlinear Signal Amplification
Using the extreme sensitivity of supercontinuum generation to input pulse power fluctuations, we demonstrate experimentally the regeneration and amplification of a weak signal by up to 46 dB.

Fabrication and characterization of superluminescent diodes for 2–3 µm wavelength

Fabrication of Fluorescent Silver Nanoclusters-based Micro-Label in Polymers
Facilitation of polymer looping and giant polymer diffusivity in crowded solutions of active particles

We study the dynamics of polymer chains in a bath of self-propelled particles (SPP) by extensive Langevin dynamics simulations in a two-dimensional model system. Specifically, we analyse the polymer looping properties versus the SPP activity and investigate how the presence of the active particles alters the chain conformational statistics. We find that SPPs tend to extend flexible polymer chains, while they rather compactify semiflexible polymers, in agreement with previous results. Here we show that higher activities of SPPs yield a higher effective temperature of the bath and thus facilitate the looping kinetics of a passive polymer chain. We explicitly compute the looping probability and looping time in a wide range of the model parameters. We also analyse the motion of a monomeric tracer particle and the polymer’s centre of mass in the presence of the active particles in terms of the time averaged mean squared displacement, revealing a giant diffusivity enhancement for the polymer chain via SPP pooling. Our results are applicable to rationalising the dimensions and looping kinetics of biopolymers at constantly fluctuating and often actively driven conditions inside biological cells or in suspensions of active colloidal particles or bacteria cells.
Fibres à cœur liquide pour la génération de paires de photons corréllés émancipées du bruit Raman

General information
State: Published
Ministry of Education publication type: D3 Professional conference proceedings
Organisations: Department of Physics, Research area: Optics, Research group: Nonlinear Fiber Optics
Authors: Barbier, M., Zaquine, I., Delaye, P.
Publication date: 2015

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Article number: P170

Bibliographical note
ISBN kysyty, HO.
Research output: Professional › Conference contribution

Fluorescence-based Real-Time Characterization of Bioaerosols

General information
State: Published
Ministry of Education publication type: G5 Doctoral dissertation (article)
Organisations: Department of Physics, Research area: Aerosol Physics
Authors: Saari, S.
Number of pages: 53
Publication date: 2015

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Place of publication: Tampere
Publisher: Tampere University of Technology
Original language: English

Publication series
Name: Tampere University of Technology. Publication
Publisher: Tampere University of Technology
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Bibliographical note
Awarding institution:Tampere University of Technology
Research output: Collection of articles › Doctoral Thesis

Frequency modulation of semiconductor disk laser pulses
A numerical model is constructed for a semiconductor disk laser mode-locked by a semiconductor saturable absorber mirror (SESAM), and the effect that the phase modulation caused by gain and absorption saturation in the semiconductor has on pulse generation is examined. The results demonstrate that, in a laser cavity with sufficient second-order dispersion, alternating-sign frequency modulation of pulses can be compensated for. We also examine a model for tuning the dispersion in the cavity of a disk laser using a Gires - Tournois interferometer with limited third-order dispersion.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Ultrafast and intense lasers, Ulyanovsk State University
Authors: Zolotovskii, I. O., Korobko, D. A., Okhotnikov, O. G.
Number of pages: 7
Pages: 628-634
Publication date: 2015
Generation of a broad IR spectrum and N-soliton compression in a longitudinally inhomogeneous dispersion-shifted fibre

The propagation of N-soliton pulses in an optical fibre with slowly decreasing, shifted anomalous dispersion has been studied experimentally and theoretically. Using a generalised nonlinear Schrodinger equation, we have constructed an adequate numerical model for light propagation in such fibre. Using numerical simulation, we have shown that the use of dispersion-decreasing fibres ensures higher average dispersive radiation intensity and better uniformity of the supercontinuum spectrum. A reduction in the third-order dispersion of such fibres enables supercontinuum generation with a bandwidth exceeding that in homogeneous fibres by several hundred nanometres even in the case of a medium-power subpicosecond source.
Generation of bound states of pulses in a soliton laser with complex relaxation of a saturable absorber

A numerical model of a soliton fibre laser with a semiconductor saturable absorber mirror (SESAM), characterised by the complex dynamics of absorption relaxation, is considered. It is shown that stationary bound states of pulses can be formed in this laser as a result of their interaction via the dispersion-wave field. The stability of stationary bound states of several pulses is analysed. It is shown that an increase in the number of pulses in a stationary bound state leads eventually to its decay and formation of a random bunch. It is found that the bunch stability is caused by the manifestation of nonlinear self-phase modulation, which attracts pulses to the bunch centre. The simulation results are in qualitative agreement with experimental data.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Ultrafast and intense lasers, Frontier Photonics, Ulyanovsk State University
Authors: Zolotovskii, I. O., Korobko, D. A., Gumenyuk, R. V., Okhotnikov, O. G.
Number of pages: 9
Pages: 26-34
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: Quantum Electronics
Volume: 45
Issue number: 1
ISSN (Print): 1063-7818
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Scopus rating (2015): SJR 0.582 SNIP 1.193 CiteScore 1.07
Scopus rating (2014): SJR 0.531 SNIP 0.927 CiteScore 0.89
Scopus rating (2013): SJR 0.555 SNIP 1.062 CiteScore 0.94
Geometry controlled anomalous diffusion in random fractal geometries: Looking beyond the infinite cluster

We investigate the ergodic properties of a random walker performing (anomalous) diffusion on a random fractal geometry. Extensive Monte Carlo simulations of the motion of tracer particles on an ensemble of realisations of percolation clusters are performed for a wide range of percolation densities. Single trajectories of the tracer motion are analysed to quantify the time averaged mean squared displacement (MSD) and to compare this with the ensemble averaged MSD of the particle motion. Other complementary physical observables associated with ergodicity are studied, as well. It turns out that the time averaged MSD of individual realisations exhibits non-vanishing fluctuations even in the limit of very long observation times as the percolation density approaches the critical value. This apparent non-ergodic behaviour concurs with the ergodic behaviour on the ensemble averaged level. We demonstrate how the non-vanishing fluctuations in single particle trajectories are analytically expressed in terms of the fractal dimension and the cluster size distribution of the random geometry, thus being of purely geometrical origin. Moreover, we reveal that the convergence scaling law to ergodicity, which is known to be inversely proportional to the observation time $T$ for ergodic diffusion processes, follows a power-law $\sim T^{-h}$ with $h < 1$ due to the fractal structure of the accessible space. These results provide useful measures for differentiating the subdiffusion on random fractals from an otherwise closely related process, namely, fractional Brownian motion. Implications of our results on the analysis of single particle tracking experiments are provided.
Green (In,Ga,Al)P-GaP light-emitting diodes grown on high-index GaAs surfaces

We report on green (550-560 nm) electroluminescence (EL) from (Al<sub>0.5</sub>Ga<sub>0.5</sub>)<sub>0.5</sub>In<sub>0.5</sub>P-(Al<sub>0.8</sub>Ga<sub>0.2</sub>)<sub>0.5</sub>In<sub>0.5</sub>P double p-i-n heterostructures with monolayer-scale tensile strained GaP insertions in the cladding layers and light-emitting diodes (LEDs) based thereupon. The structures are grown side-by-side on high-index and (100) GaAs substrates by molecular beam epitaxy. Cross-sectional transmission electron microscopy studies indicate that GaP insertions are flat, thus the GaP-barrier substrate orientation-dependent heights should match the predictions of the flat model. At moderate current densities (∼500 A/cm<sup>2</sup>) the EL intensity of the structures is comparable for all substrate orientations. Opposite to the (100)-grown strictures, the EL spectra of (211) and (311)-grown devices are shifted towards shorter wavelengths (∼550 nm at room temperature). At high current densities (>1 kA/cm<sup>2</sup>) a much higher EL intensity is achieved for the devices grown on high-index substrates. The integrated intensity of (311)-grown structures gradually saturates at current densities above 4 kA/cm<sup>2</sup>, whereas no saturation is revealed for (211)-grown structures up to the current densities above 14 kA/cm<sup>2</sup>. We attribute the effect to the surface orientation-dependent engineering of the GaP band structure which prevents the escape of the nonequilibrium electrons into the indirect conduction band minima of the p-doped (Al<sub>0.8</sub>Ga<sub>0.2</sub>)<sub>0.5</sub>In<sub>0.5</sub>P cladding layers.

Green (In,Ga,Al)P-GaP light-emitting diodes grown on high-index GaAs surfaces

We report on green (550-560 nm) electroluminescence (EL) from (Al<sub>0.5</sub>Ga<sub>0.5</sub>)<sub>0.5</sub>In<sub>0.5</sub>P-(Al<sub>0.8</sub>Ga<sub>0.2</sub>)<sub>0.5</sub>In<sub>0.5</sub>P double p-i-n heterostructures with monolayer-scale tensile strained GaP insertions in the cladding layers and light-emitting diodes (LEDs) based thereupon. The structures are grown side-by-side on high-index and (100) GaAs substrates by molecular beam epitaxy. Cross-sectional transmission electron microscopy studies indicate that GaP insertions are flat, thus the GaP-barrier substrate orientation-dependent heights should match the predictions of the flat model. At moderate current densities (∼500 A/cm<sup>2</sup>) the EL intensity of the structures is comparable for all substrate orientations. Opposite to the (100)-grown strictures, the EL spectra of (211) and (311)-grown devices are shifted towards shorter wavelengths (∼550 nm at room temperature). At high current densities (>1 kA/cm<sup>2</sup>) a much higher EL intensity is achieved for the devices grown on high-index substrates. The integrated intensity of (311)-grown structures gradually saturates at current densities above 4 kA/cm<sup>2</sup>, whereas no saturation is revealed for (211)-grown structures up to the current densities above 14 kA/cm<sup>2</sup>. We attribute the effect to the surface orientation-dependent engineering of the GaP band structure which prevents the escape of the nonequilibrium electrons into the indirect conduction band minima of the p-doped (Al<sub>0.8</sub>Ga<sub>0.2</sub>)<sub>0.5</sub>In<sub>0.5</sub>P cladding layers.
>8W GaInNAs VECSEL emitting at 615 nm

We report a high-power VECSEL emitting >8W around 615 nm. The gain chip of the laser was grown by plasmaassisted molecular beam epitaxy and it comprised 10 GaInNAs quantum wells. The VECSEL cavity had a V-shaped geometry and a 10-mm-long non-critically phase-matched LBO crystal for second harmonic generation. The cavity incorporated also an etalon and a birefringent filter for controlling the output wavelength. With the aid of the second harmonic output and the infrared light leaking out from the laser cavity, the single-pass conversion efficiency of the crystal was estimated to have a value of 0.75%.

General information
State: Published

Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Frontier Photonics
Authors: Leinonen, T., Penttinen, J. P., Korpipäärvi, V. M., Kantola, E., Guina, M.
Publication date: 2015

Host publication information
Title of host publication: Proceedings of SPIE : Vertical External Cavity Surface Emitting Lasers (VECSELS) V
Volume: 9349
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Keywords: frequency doubling, high power visible laser, OPSL, orange-red VECSEL, SDL, SHG
DOIs:
10.1117/12.2079162

Halogen bonding enhances nonlinear optical response in poled supramolecular polymers

We demonstrate that halogen bonding strongly enhances the nonlinear optical response of poled supramolecular polymer systems. We compare three nonlinear optical chromophores with similar electronic structures but different bond-donating units, and show that both the type and the strength of the noncovalent interaction between the chromophores and the polymer matrix play their own distinctive roles in the optical nonlinearity of the systems.

General information
State: Published

Organisations: Department of Physics, Research area: Optics, Research group: Nonlinear Optics, Department of Chemistry and Bioengineering, Research group: Supramolecular photochemistry, Frontier Photonics, Tampere Univ Technol, Tampere University of Technology, Dept Phys, Univ Milan, Consiglio Nazionale delle Ricerche (CNR), University of Milan, Inst Mol Sci & Technol, CNR, ISTM, Politecn Milan, Polytechnic University of Milan, NFMLab, DCMIC Giulio Natta, Aalto University
Authors: Virikki, M., Tuominen, O., Forni, A., Saccone, M., Metrangolo, P., Resnati, G., Kauranen, M., Priimägi, A.
Number of pages: 4
Pages: 3003-3006
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: Journal of Materials Chemistry C
Volume: 3
ISSN (Print): 2050-7534
Ratings:
Scopus rating (2016): CiteScore 5.14 SJR 1.806 SNIP 1.28
Scopus rating (2015): SJR 1.751 SNIP 1.577 CiteScore 5.32
How endoglucanase enzymes act on cellulose nanofibrils: role of amorphous regions revealed by atomistic simulations

Transformation of cellulose into monosaccharides can be achieved in a chemical process performed by a special group of enzymes known as cellulases. We have used atomistic molecular dynamics simulations to study endoglucanase II (Cel5A) that is one of the proteins in this group. Based on the atomistic simulation results, we discuss how the Cel5A enzyme interacts with cellulose fibrils comprised of both crystalline and amorphous regions. We show that the enzyme’s carbohydrate-binding domain prefers to interact with crystalline regions of cellulose, while the catalytic domain has a high affinity to the amorphous regions of fibrils. In particular, through electrostatic interactions the catalytic domain attracts loose glucose chains to its catalytic cleft. The atomistic details of the enzyme–cellulose interaction are presented and the implications for practical applications are briefly discussed.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research group: Biological Physics and Soft Matter, Computational Science X (CompX), Lappeenranta University of Technology, University of Jyväskylä, Stora Enso, Department of Physics and Nanoscience Center
Authors: Orłowski, A., Róg, T., Paavilainen, S., Manna, M., Heiskanen, I., Backfolk, K., Timonen, J., Vattulainen, I.
Number of pages: 15
Pages: 2911-2925
Publication date: 2015
Peer-reviewed: Yes
Early online date: 17 Jul 2015

Publication information
Journal: Cellulose
Volume: 22
Issue number: 5
ISSN (Print): 0969-0239
Ratings:
Scopus rating (2016): CiteScore 3.68 SJR 1.126 SNIP 1.144
Scopus rating (2015): SJR 1.153 SNIP 1.24 CiteScore 3.55
Scopus rating (2014): SJR 1.071 SNIP 1.334 CiteScore 3.58
Scopus rating (2013): SJR 1.127 SNIP 1.48 CiteScore 3.83
Scopus rating (2012): SJR 1.179 SNIP 1.71 CiteScore 3.74
Scopus rating (2011): SJR 1.354 SNIP 1.795 CiteScore 3.99
Scopus rating (2010): SJR 0.873 SNIP 1.384
Scopus rating (2009): SJR 1.038 SNIP 1.219
Scopus rating (2008): SJR 0.926 SNIP 1.123
Scopus rating (2007): SJR 0.754 SNIP 1.034
Scopus rating (2006): SJR 0.699 SNIP 1.15
Scopus rating (2005): SJR 1.112 SNIP 1.318
Scopus rating (2004): SJR 0.855 SNIP 1.072
Scopus rating (2003): SJR 0.81 SNIP 1.02
Scopus rating (2002): SJR 0.649 SNIP 0.689
Scopus rating (2001): SJR 0.602 SNIP 0.785
Scopus rating (2000): SJR 0.583 SNIP 0.773
Scopus rating (1999): SJR 0.67 SNIP 1.14
Light-Induced Waveguides in Nematic Liquid Crystals

Spatial optical solitary waves in media with nonlinear refractive index are self-localized beams as well as waveguides induced by light. We review their guiding features in reorientational birefringent soft matter, namely nematic liquid crystals, for which a highly "nonlocal" response enhances the confinement, stabilization, and robustness of the generated optical solitary waves, termed "nematicons." The waveguiding properties of the spatial solitons in nematic liquid crystals are illustrated through the confinement of low-power signals and other solitary waves, as well as optical vortices.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Tampere University of Technology, University of Edinburgh
Authors: Assanto, G., Smyth, N. F.
Publication date: 2015
Peer-reviewed: Yes
Early online date: 18 Jun 2015

Publication information
Journal: IEEE Journal of Selected Topics in Quantum Electronics
Volume: 22
Issue number: 2
Article number: 7128341
ISSN (Print): 1077-260X
Ratings:
Scopus rating (2016): CiteScore 2.96 SJR 1.139 SNIP 1.322
Scopus rating (2015): SJR 1.449 SNIP 1.393 CiteScore 3.03
Scopus rating (2014): SJR 1.889 SNIP 2.072 CiteScore 3.49
Scopus rating (2013): SJR 2.258 SNIP 2.38 CiteScore 4.55
Scopus rating (2012): SJR 2.742 SNIP 2.661 CiteScore 4.35
Scopus rating (2011): SJR 2.367 SNIP 2.845 CiteScore 3.87
Scopus rating (2010): SJR 2.217 SNIP 2.599
Scopus rating (2009): SJR 2.964 SNIP 2.869
Scopus rating (2008): SJR 2.476 SNIP 2.433
Scopus rating (2007): SJR 2.428 SNIP 1.746
Scopus rating (2006): SJR 2.131 SNIP 2.383
Scopus rating (2005): SJR 2.93 SNIP 2.594
Scopus rating (2004): SJR 2.827 SNIP 2.62
Scopus rating (2003): SJR 3.121 SNIP 3.103
Scopus rating (2002): SJR 2.664 SNIP 2.508
Scopus rating (2001): SJR 2.25 SNIP 1.926
Scopus rating (2000): SJR 2.37 SNIP 1.335
Scopus rating (1999): SJR 3.466 SNIP 1.611
Original language: English
ASJC Scopus subject areas: Electrical and Electronic Engineering, Atomic and Molecular Physics, and Optics
Keywords: Liquid crystals, Nonlinear optics, Optical solitons, Optical vortices, Solitons
DOIs: 10.1109/JSTQE.2015.2446762
Links: http://www.scopus.com/inward/record.url?scp=84941047633&partnerID=8YFLogxK (Link to publication in Scopus)
Source: Scopus
Source-ID: 84941047633
Research output: Scientific - peer-review › Article
Long-term corrosion protection by a thin nano-composite coating

Abstract We report and discuss the corrosion protective properties of a thin nano-composite coating system consisting of an 11 µm thick polyester acrylate (PEA) basecoat, covered by an approximately 1–2 µm thick layer of TiO2 nanoparticles carrying a 0.05 µm thick hexamethyl disiloxane (HMDSO) top coat. The corrosion protective properties were evaluated on carbon steel substrates immersed in 3 wt% NaCl solution by open circuit potential (OCP) and electrochemical impedance spectroscopy (EIS) measurements. The protective properties of each layer, and of each pair of layers, were also evaluated to gain further understanding of the long-term protective properties offered by the nano-composite coating. The full coating system showed excellent corrosion protective properties in the corrosive environment of 3 wt% NaCl-solution for an extended period of 100 days, during which the coating impedance, at the lower frequency limit (0.01 Hz), remained above 108 Ω cm². We suggest that the excellent corrosion protective properties of the complete coating system is due to a combination of (i) good adhesion and stability of the PEA basecoat, (ii) the surface roughness and the elongated diffusion path provided by the addition of TiO2 nanoparticles, and (iii) the low surface energy provided by the HMDSO top coat.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research area: Aerosol Physics, Research group: Aerosol Synthesis, SP Technical Research Institute of Sweden
Authors: Ejenstam, L., Tuominen, M., Haapanen, J., Mäkelä, J. M., Pan, J., Swerin, A., Claesson, P. M.
Pages: 2333–2342
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: Applied Surface Science
Volume: 357
Issue number: Part B
ISSN (Print): 0169-4332
Ratings:
Scopus rating (2016): CiteScore 3.37 SJR 0.951 SNIP 1.225
Scopus rating (2015): SJR 0.914 SNIP 1.3 CiteScore 3.13
Scopus rating (2014): SJR 0.958 SNIP 1.477 CiteScore 2.96
Scopus rating (2013): SJR 0.965 SNIP 1.488 CiteScore 2.78
Scopus rating (2012): SJR 0.918 SNIP 1.373 CiteScore 2.26
Scopus rating (2011): SJR 0.908 SNIP 1.402 CiteScore 2.27
Scopus rating (2010): SJR 0.924 SNIP 1.141
Scopus rating (2009): SJR 0.842 SNIP 1.023
Scopus rating (2008): SJR 0.899 SNIP 1.087
Scopus rating (2007): SJR 0.795 SNIP 0.945
Scopus rating (2006): SJR 0.852 SNIP 1.052
Scopus rating (2005): SJR 0.679 SNIP 0.946
Scopus rating (2004): SJR 0.964 SNIP 1.126
Scopus rating (2003): SJR 0.988 SNIP 1.027
Scopus rating (2002): SJR 0.921 SNIP 0.954
Scopus rating (2001): SJR 0.841 SNIP 0.796
Scopus rating (2000): SJR 0.866 SNIP 0.772
Scopus rating (1999): SJR 1.064 SNIP 0.907
Original language: English
Keywords: Liquid flame spray, Corrosion, Corrosion protection, Carbon steel, Plasma coating, Impedance spectroscopy
DOI: 10.1016/j.apsusc.2015.09.238
Links:
Source: RIS
Source-ID: urn:DEEABDDCBA0C729637D296E29C27BE21
Research output: Scientific › peer-review › Article
MBE GROWN GaInNAsSb MULTIJUNCTION SOLAR CELLS: PATH TOWARDS 50% EFFICIENCY

General information
State: Published
Ministry of Education publication type: D3 Professional conference proceedings
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications
Authors: Aho, A. J., Polojärvi, V. V., Aho, T. A., Raappana, M. J. S., Tukiainen, A. K., Guina, M. D.
Publication date: 2015

Host publication information
Title of host publication: 18th European Molecular Beam Epitaxy Workshop. Canazei, Italy
ASJC Scopus subject areas: Energy(all)
Links:

Bibliographical note
Research output: Professional › Conference contribution

Measurement of the Temporal Coherence of Supercontinuum Light
We experimentally measure, for the first time, the second-order temporal coherence of supercontinuum pulses from the time-resolved interference fringes observed at the output of a Michelson interferometer using cross-correlation frequency-resolved optical gating.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Physics, Research area: Optics, Research group: Nonlinear Fiber Optics, Institute of Photonics
Publication date: 2015

Host publication information
Title of host publication: 2015 European Conference on Lasers and Electro-Optics - European Quantum Electronics Conference
Publisher: OSA
Article number: EE_3_1
ISBN (Print): 978-1-4673-7475-0
Keywords: supercontinuum, coherence
Links:
https://www.osapublishing.org/abstract.cfm?uri=EQEC-2015-EE_3_1
Research output: Scientific - peer-review › Conference contribution

Measurements of particulates and gas phase precursors emissions from fresh ship plumes during the Big Glenn 2014 Campaign

General information
State: Published
Ministry of Education publication type: D3 Professional conference proceedings
Organisations: Department of Physics, Research area: Aerosol Physics, University of Gothenburg
Authors: Kuuluvainen, H., Faxon, C., Psichoudaki, M., Thomson, E. S., Eriksson, A., Kristensson, A., Svenningson, B., Mellqvist, J., Salo, K., Hallquist, M.
Publication date: 2015

Host publication information
Title of host publication: EAC 2015, European Aerosol Conference, 6-11 September, 2015, Milan, Italy

Bibliographical note
ISBN kysytty, HO.
Ei ole, HO.
Research output: Professional › Conference contribution

Memory effect in crystallization of amorphous Ge2Sb2Te5
Microdisk lasers based on GaInNAsSb/GaAsN quantum well active region
Microdisk lasers based on novel InGaAsNSb/GaAsN quantum well active region are developed and studied under optical pumping. Room temperature lasing at 1.55 μm in 2.3 μm in diameter microdisks with InGaAsNSb/GaAsN QW is demonstrated.

Monolithic GaInNAsSb/GaAs VECSEL emitting at 1550 nm
We report the first monolithic GaAs-based vertical external-cavity surface-emitting laser (VECSEL) operating at 1550 nm. The VECSEL is based on a gain mirror which was grown by plasma-assisted molecular beam epitaxy and comprises 8 GaInNAsSb/GaAs quantum wells and an AlAs/GaAs distributed Bragg reflector. When pumped by an 808 nm diode laser, the laser exhibited an output power of 80 mW for a mount temperature of 16 °C.
Multi-component gas detection in the mid-IR

Noninstantaneous polarization dynamics in dielectric media
Nonlinear optical activity effects in complex anisotropic three-dimensional media

We perform numerical modelling of nonlinear optical (NLO) microscopy of complex anisotropic three-dimensional (3D) media using the uncoupled dipole approximation. The modelling is applied to 3D biological microstructures resembling collagen fibers and multilamellar vesicles. The results elucidate how nonlinear optical activity effects, such as secondharmonic generation circular dichroism, can arise from 3D morphological chirality, in addition to molecular level chirality. We also show how thirdharmonic generation circular dichroism could act as a contrast mechanism for visualizing local structural ordering in 3D anisotropic materials.
Observation of stable-vector vortex solitons

We report on the first experimental observation of stable-vector vortex solitons in nonlocal nonlinear media with a reorientational response, such as nematic liquid crystals. These solitons consist of two co-polarized, mutually trapped beams of different colors, a bright fundamental spatial soliton, and a nonlinear optical vortex. The nonlinear vortex component, which is normally unstable in nonlinear media, is stabilized and confined here by the highly nonlocal refractive potential induced by the soliton.
Power and wavelength scaling using semiconductor disk laser - bismuth fiber MOPA systems

We present a master oscillator power amplifier (MOPA) system that comprises a mode-locked semiconductor disk laser (SDL) emitting at 1.33 µm and a bismuth-doped fiber amplifier. The mode-locked SDL was fabricated by wafer bonding an InP-based gain section with a GaAs-based distributed Bragg reflector (DBR) using (3-Mercaptopropyl)trimethoxysilane. The bismuth-doped fiber amplifier was pumped with a continuous wave SDL emitting at 1.18 µm. The MOPA system produced pulses at a repetition rate of 827 MHz with a pulse energy of 0.62 nJ, which corresponds to an average output power of more than 0.5 W.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Research group: Ultrafast and intense lasers, Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Frontier Photonics, Ulyanovsk State University, Fiber Optics Research Center, Russian Academy of Sciences
Authors: Heikkinen, J., Gumenyuk, R., Rantamäki, A., Lyytikäinen, J., Leinonen, T., Zolotovskii, I., Melkumov, M., Dianov, E. M., Okhotnikov, O. G.
Number of pages: 7
Publication date: 2015

Host publication information
Title of host publication: Vertical External Cavity Surface Emitting Lasers (VECSELs) V
Place of publication: BELLINGHAM
Publisher: SPIE
Editor: Guina, M.
Article number: 93490E
ISBN (Print): 9781628414394

Publication series
Name: Proceedings of SPIE
Publisher: SPIE-INT SOC OPTICAL ENGINEERING
Volume: 9349
ISSN (Print): 0277-786X
Keywords: Semiconductor disk laser (SDL), vertical-external-cavity surface-emitting laser (VECSEL), modelocking, wafer bonding, bismuth-doped fiber, master oscillator power amplifier (MOPA), SUPPERCONTINUUM GENERATION, OUTPUT POWER, PICOSECOND, VECSEL, PULSES, GHZ
DOIs: 10.1117/12.2076805
Source: WOS
Source-ID: 000353134900011
Research output: Scientific - peer-review » Conference contribution

PT-symmetric solitons

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Physics, Research group: Nonlinear Optics, Research area: Optics
Authors: Jisha, C. P., Alberucci, A.
Number of pages: 25
Pages: 279-303
Publication date: 2015

Host publication information
Title of host publication: Odyssey of Light in Nonlinear Optical Fibers : Theory and Applications
Publisher: CRC Press
Editors: Porsezian, K., Ganapathy, R.
ISBN (Print): 9781482236132
DOIs:
Quantum dot semiconductor disk laser at 1.3 μm

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Ultrafast and intense lasers, Frontier Photonics, Ioffe Institute, Polytekhnicheskaya str. 26, Saint-Petersburg 194021, Saint-Petersburg Polytechnical University, Saint-Petersburg 195251
Number of pages: 4
Pages: 3400-3403
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: Optics Letters
Volume: 40
Issue number: 14
ISSN (Print): 0146-9592
Ratings:
Scopus rating (2016): CiteScore 3.54 SJR 1.864 SNIP 1.658
Scopus rating (2015): SJR 2.142 SNIP 1.642 CiteScore 3.53
Scopus rating (2014): SJR 2.497 SNIP 2.056 CiteScore 3.86
Scopus rating (2013): SJR 2.458 SNIP 2.095 CiteScore 3.95
Scopus rating (2012): SJR 2.596 SNIP 1.95 CiteScore 3.52
Scopus rating (2011): SJR 2.518 SNIP 2.475 CiteScore 3.69
Scopus rating (2010): SJR 2.669 SNIP 2.293
Scopus rating (2009): SJR 3.167 SNIP 2.665
Scopus rating (2008): SJR 3.408 SNIP 2.378
Scopus rating (2007): SJR 3.489 SNIP 2.102
Scopus rating (2006): SJR 3.143 SNIP 2.334
Scopus rating (2005): SJR 3.251 SNIP 2.483
Scopus rating (2004): SJR 3.521 SNIP 2.718
Scopus rating (2003): SJR 3.708 SNIP 2.573
Scopus rating (2002): SJR 3.702 SNIP 2.39
Scopus rating (2001): SJR 3.62 SNIP 2.244
Scopus rating (2000): SJR 3.416 SNIP 1.705
Scopus rating (1999): SJR 4.044 SNIP 1.699
Original language: English
DOIs:
10.1364/OL.40.003400
Research output: Scientific - peer-review › Article

Recent progress in wafer-fused VECSELs emitting in the 1310 nm waveband
Over the last years we have continuously improved the performance of 1300 nm band VECSELs with wafer fused gain mirrors in the intra-cavity diamond and the flip-chip heat dissipation configurations. In this work we present recent results for gain mirrors that implement both heat-dissipation schemes applied to the same fused gain mirror structure. We demonstrate record high output powers of 7.1 W in the intra-cavity diamond heat-spreader configuration and 6.5 W in the flip-chip heat dissipation scheme. These improvements are achieved due to optimization of the wafer fused gain mirror structure based on AlGaInAs/InP-active region fused to AlAs-GaAs distributed Bragg reflector (DBR) and application of efficient methods of bonding semiconductor gain mirror chips to diamond heatspreaders.
Scanning of radioluminescence emission with a PMT for remote detection of alpha contamination

Second-harmonic generation from metasurfaces: More than resonance enhancement
Self-consistent total-energy approximation for electron gas systems

Employing a local formula of Parr [J. Chem. Phys. 93, 3060 (1988)] for the electron-electron interaction energy, we derive a self-consistent approximation for the total energy of a general N-electron system. Our scheme works as a local variant of the Thomas-Fermi approximation and yields the total energy and density as a function of the external potential, the number of electrons, and the chemical potential determined upon normalization. Our tests for Hooke's atoms, jellium, and model atoms up to ~1500 electrons show that reasonable total energies can be obtained with almost negligible computational cost. Our approximation may serve as a useful tool to provide initial results for more advanced approaches that also include binding.
SESAM mode-locked Tm: CALGO laser at 2 μm
GaSb-based SESAM is successfully employed for passive mode locking of a Tm$^{3+}$: CaGdAlO$_4$ laser operating near 2 μm. The pulse duration is around 650 fs at a repetition rate ~100 MHz.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Research group: Semiconductor Technology and Applications, Optoelectronics Research Centre, Frontier Photonics, Max Born Institute, Shanghai Jiao tong University, Jiangsu Normal University, Vital Materials Co., Limited, Dipartimento di Ingegneria Industriale e Dell'Informazione, Universitat Rovira i Virgili, Belarusian National Technical University
Publication date: 2015

Host publication information
Title of host publication: Advanced Solid State Lasers, ASSL 2015
Publisher: Optical Society of America OSA
Article number: AW1A.2
ISBN (Print): 9781943580026
ASJC Scopus subject areas: Electrical and Electronic Engineering, Electronic, Optical and Magnetic Materials
DOIs:
10.1364/ASSL.2015.AW1A.2
Source: Scopus
Source-ID: 84947590871
Research output: Scientific - peer-review › Conference contribution

Shadow Ghost Imaging in the Time Domain

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Department of Physics, Research area: Optics, Research group: Nonlinear Fiber Optics, Frontier Photonics
Authors: Ryczkowski, P., Barbier, M., Friberg, A. T., Dudley, J. M., Genty, G.
Publication date: 2015

Host publication information
Title of host publication: Frontiers in Optics 2015
Publisher: OSA
Article number: FW6C.1
ISBN (Electronic): 978-1-943580-03-3
DOIs:
10.1364/FIO.2015.FW6C.1
Source: Bibtex
Source-ID: urn:uuid:a11e0cac2c12b03797ccabae4da08320
Research output: Scientific › Conference contribution

Simulated and Experimental Performance of High Efficiency GaInNAsSb Solar Cells

General information
State: Published
Ministry of Education publication type: D3 Professional conference proceedings
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications
Authors: Aho, A. J., Tukiainen, A. K., Polojärvi, V. V., Aho, T., Raappana, M. J. S., Isoaho, R., Guina, M. D.
Publication date: 2015

Host publication information
Title of host publication: 31st European Photovoltaic Solar Energy Conference and Exhibition

Bibliographical note
xpresentation
Research output: Professional › Conference contribution
Single micro-particle scattering detection based on Edge Filter Enhanced Self-Mixing Interferometry

**General information**
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Research area: Optics, Department of Physics, Research group: Applied Optics
Authors: Contreras, V., Lonnqvist, J., Toivonen, J.
Pages: CH_P_11
Publication date: 2015

**Host publication information**
Title of host publication: 2015 European Conference on Lasers and Electro-Optics - European Quantum Electronics Conference
Publisher: Optical Society of America
ISBN (Electronic): 978-1-4673-7475-0
Links:
Source: Bibtex
Source-ID: urn:fc7373a93e31bca04a5098b47e6a6
Research output: Scientific › Conference contribution

Single-mode 1180 nm dilute nitride DBR laser for frequency doubling to 590 nm

**General information**
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Optoelectronics Research Centre, Research group: Nanophotonics, Research group: Semiconductor Technology and Applications
Authors: Korpijärvi, V., Viheriälä, J., Aho, A. T., Guina, M.
Publication date: 2015

**Host publication information**
Title of host publication: Northern Optics & Photonics 2015 : June 2-4, 2015, Lappeenranta, Finland
Place of publication: Joensuu
Publisher: University of Eastern Finland

**Bibliographical note**
AUX=orc,"Aho, Antti T."
Research output: Scientific › Conference contribution

Soliton enhancement of spontaneous symmetry breaking

Spontaneous symmetry breaking (SSB) occurs when noise triggers an initially symmetric system to evolve toward one of its nonsymmetric states. Topological and optical SSB involve material reconfiguration/transition and light propagation/distribution in time or space, respectively. In anisotropic optical media, light beam propagation and distribution of the optic axis can be linked, thereby connecting topological and optical SSB. Using nonlinear soft matter, namely uniaxial liquid crystals, we report on simultaneous topological and optical SSB, showing that spatial solitons enhance the noise-driven transition of the medium from a symmetric to an asymmetric configuration, while acquiring a power-dependent transverse velocity in either of two specular directions with respect to the initial wavevector. Solitons enhance SSB by further distorting the optic axis distribution through nonlinear reorientation, resulting in power-tunable walk-off as well as hysteresis in beam refraction versus angle of incidence.

**General information**
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research group: Nonlinear Optics, Frontier Photonics, University "Roma Tre", University of Southampton, United Kingdom
Authors: Alberucci, A., Piccardi, A., Kravets, N., Buchnev, O., Assanto, G.
Number of pages: 7
Pages: 783-789
Publication date: 2015
Peer-reviewed: Yes
Supercontinuum generation as a signal amplifier

Supercontinuum white-light generation in optical fibers is a process that is known for its extreme sensitivity toward fluctuations of the input pulses, giving rise to a strong amplification of input noise. Such noise amplification has been recognized as a detrimental effect that prevents compression of the broad white-light spectra into a few-cycle pulse. Here, we show that the same effect can be exploited to amplify and recover faint modulation signals to an extent that seems impossible with any electronic method. We experimentally demonstrate the deterministic amplification of faint amplitude modulation signals by up to 60 dB. As we show from numerical simulations, this amplification process arises from the interaction dynamics between solitons and dispersive radiation in the fiber. The resulting all-optic signal restoration provides a new photonic building block that enables signal processing at virtually unlimited processing speeds.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Department of Physics, Research area: Optics, Research group: Nonlinear Fiber Optics, Frontier Photonics
Authors: Orsila, L., Sand, J., Närhi, M., Genty, G., Steinmeyer, G.
Number of pages: 8
Pages: 757-764
Publication date: 2015
Peer-reviewed: Yes
Tellurium (Te)-doping of self-catalyzed GaAs nanowires (NWs) grown by molecular beam epitaxy is reported. The effect of Te-doping on the morphological and crystal structure of the NWs is investigated by scanning electron microscopy (SEM) and high-resolution transmission electron microscopy (TEM). The study reveals that the lateral growth rate increases and axial growth rate decreases with increasing Te doping level. The changes in the NW morphology can be reverted to some extent by changing the growth temperature. At high doping levels, formation of twinning superlattice is observed alongside the {111}-facetted sidewalls. Finally, the incorporation of Te is confirmed by Raman spectroscopy.

**General information**

State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Research group: Nanophotonics, Department of Materials Science, Research group: Materials Characterization, Engineering materials science and solutions (EMASS), Frontier Photonics
Authors: Suomalainen, S., Hakkarainen, T. V., Salminen, T., Koskinen, R., Honkanen, M., Luna, E., Guina, M.
Publication date: 2015
Peer-reviewed: Yes

**Publication Information**

Volume: 107
Article number: 012101
ISSN (Print): 0003-6951

Ratings:
Scopus rating (2016): CiteScore 2.67 SJR 1.132 SNIP 0.996
Scopus rating (2015): SJR 1.085 SNIP 0.983 CiteScore 2.47
Scopus rating (2014): SJR 1.799 SNIP 1.462 CiteScore 3.25
Scopus rating (2013): SJR 2.149 SNIP 1.652 CiteScore 3.77
Scopus rating (2012): SJR 2.554 SNIP 1.754 CiteScore 3.76
Scopus rating (2011): SJR 2.805 SNIP 1.94 CiteScore 4.04
Scopus rating (2010): SJR 2.926 SNIP 1.789
Scopus rating (2009): SJR 2.857 SNIP 1.848
Scopus rating (2008): SJR 2.934 SNIP 1.83
Scopus rating (2007): SJR 3.039 SNIP 1.913
Scopus rating (2006): SJR 3.457 SNIP 2.288
Scopus rating (2005): SJR 3.709 SNIP 2.382
Scopus rating (2004): SJR 3.904 SNIP 2.38
Scopus rating (2003): SJR 3.765 SNIP 2.27
Scopus rating (2002): SJR 3.917 SNIP 2.365
Scopus rating (2001): SJR 4.111 SNIP 2.212
Scopus rating (2000): SJR 4.277 SNIP 2.013
Scopus rating (1999): SJR 4.35 SNIP 2.11
Original language: English
DOI: 10.1063/1.4926494

**Bibliographical note**

ORG=orc,0.85
ORG=mol,0.15

Research output: Scientific - peer-review > Article

**Temperature coefficients for GaInP/GaAs/GaInNAsSb solar cells**

We report the temperature coefficients for MBE-grown GaInP/GaAs/GaInNAsSb multijunction solar cells and the corresponding single junction sub-cells. Temperature-dependent current-voltage measurements were carried out using a solar simulator equipped with a 1000W Xenon lamp and a three-band AM1.5D simulator. The triple-junction cell exhibited an efficiency of 31% at AM1.5G illumination and an efficiency of 37-39% at 70x real sun concentration. The external quantum efficiency was also measured at different temperatures. The temperature coefficients up to 80°C, for the open circuit voltage, the short circuit current density, and the conversion efficiency were determined to be -7.5mV/°C, 0.040mA/cm2/°C, and -0.09%/°C, respectively.
The Prototype Phase Change Material Ge\textsubscript{2}Sb\textsubscript{2}Te\textsubscript{5}: Amorphous structure and crystallization

The widespread use of phase change materials in storage media is based on the extremely rapid and reversible switching between the amorphous and crystalline phases of some families of semiconducting alloys. Detailed information about the structure of the amorphous phase and the mechanism of crystallization are essential for the development of new storage media, and we study both aspects here using density functional/molecular dynamics simulations of Ge\textsubscript{2}Sb\textsubscript{2}Te\textsubscript{5}, the prototype phase change material of the Ge/Sb/Te semiconductor family.

**General information**

State: Published

Ministry of Education publication type: A1 Journal article-refereed

Organisations: Optoelectronics Research Centre, Research group: Ultrafast and intense lasers, Research group: Laboratory for Future Electronics, Department of Electronics and Communications Engineering, Research group: Surface Science, Frontier Photonics

Authors: Rantamäki, A., Saarinen, E. J., Lyytikäinen, J., Heikkinen, J., Kontio, J. M., Lahtonen, K., Valden, M., Okhotnikov, O.

Publication date: 2015

Peer-reviewed: Yes
Towards high power flip-chip long-wavelength semiconductor disk lasers

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Research group: Ultrafast and intense lasers, Research group: Surface Science, Frontier Photonics
Authors: Rantamäki, A., Saarinen, E., Lyytikäinen, J., Heikkinen, J., Lahtonen, K., Valden, M., Okhotnikov, O.
Publication date: 2015

Host publication information
Title of host publication: Proceedings of SPIE
Volume: 9349
Publisher: SPIE
ISBN (Electronic): 9781628414394
DOI: 10.1117/12.2076795
Research output: Scientific - peer-review › Conference contribution

Triboelectric charging of fungal spores during resuspension and rebound

General information
State: Published
Ministry of Education publication type: D3 Professional conference proceedings
Organisations: Department of Physics, Research area: Aerosol Physics, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group
Tunable nonlinear effects through focused spatially phase-shaped beams

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Department of Physics, Research area: Optics, Research group: Nonlinear Optics, Aalto University
Authors: Turquet, L., Bautista, G., Karvonen, L., Dhaka, V., Chen, Y., Jiang, H., Huhtio, T., Lipsanen, H., Kauranen, M.
Publication date: 2015
Host publication information
Title of host publication: European Quantum Electronics Conference 2015
Publisher: Optical Society of America
Article number: EG_P_11
ISBN (Electronic): 978-1-4673-7475-0
Keywords: Nonlinear optics, SPATIAL LIGHT-MODULATOR, MICROSCOPY, beam shaping
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EXT="Dhaka, V."
EXT="Chen, Y."
Source: Bibtex
Source-ID: urn:3623590cd14102e9789109aae5912da4
Research output: Scientific › Conference contribution

Tuning second-harmonic generation from silicon nitride thin films through material composition

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Physics, Research area: Optics, Research group: Nonlinear Optics, Optoelectronics
Research Centre, Research group: Nanophotonics, Research group: Nonlinear Fiber Optics
Authors: Czaplicki, R., Koskinen, K., Niemi, T., Genty, G., Kauranen, M.
Number of pages: 1
Pages: 26-26
Publication date: 2015
Host publication information
Title of host publication: Northern Optics & Photonics 2015, June 2-4, 2015, Lappeenranta, Finland : NOP2015 Proceedings
Place of publication: University of Eastern Finland, Faculty of Science and Forestry, Institute of Photonics, Joensuu
Editors: Setälä, T., Friberg, A. T., Saarinen, J., Tervo, J.
Bibliographical note
ORG=fys,0.7
ORG=orc,0.3
Research output: Scientific - peer-review › Conference contribution

Two-time coherence of pulse trains and the integrated degree of temporal coherence
We examine the temporal coherence properties of trains of nonidentical short optical pulses in the framework of the second-order coherence theory of nonstationary light. Considering Michelson's interferometric measurement of temporal coherence, we demonstrate that time-resolved interferograms reveal the full two-time temporal coherence function of the partially coherent pulse train. We also show that the result given by the time-integrated Michelson interferogram equals the
true degree of temporal coherence only when the pulse train is quasistationary, i.e., the coherence time is a small fraction of the pulse duration. True two-time and integrated coherence functions produced by specific models representing perturbed trains of mode-locked pulses and supercontinuum pulse trains produced in nonlinear fibers are illustrated.

**General information**

State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research group: Nonlinear Fiber Optics, Research area: Optics, Frontier Photonics, Ita-Suomen yliopisto, Institute of Photonics
Authors: Dutta, R., Friberg, A. T., Genty, G., Turunen, J.
Number of pages: 7
Pages: 1631-1637
Publication date: 2015
Peer-reviewed: Yes

**Publication information**

Journal: Journal of the Optical Society of America A: Optics Image Science and Vision
Volume: 32
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Scopus rating (2016): CiteScore 1.54 SJR 0.621 SNIP 1.02
Scopus rating (2015): SJR 0.951 SNIP 1.156 CiteScore 1.61
Scopus rating (2014): SJR 0.906 SNIP 1.339 CiteScore 1.72
Scopus rating (2013): SJR 1.04 SNIP 1.336 CiteScore 1.66
Scopus rating (2012): SJR 1.062 SNIP 1.217 CiteScore 1.65
Scopus rating (2011): SJR 1.098 SNIP 1.486 CiteScore 1.82
Scopus rating (2010): SJR 1.254 SNIP 1.578
Scopus rating (2009): SJR 1.394 SNIP 1.614
Scopus rating (2008): SJR 1.469 SNIP 1.526
Scopus rating (2006): SJR 1.562 SNIP 1.959
Scopus rating (2005): SJR 1.361 SNIP 1.806
Scopus rating (2004): SJR 1.381 SNIP 1.832
Scopus rating (2003): SJR 1.436 SNIP 1.742
Scopus rating (2002): SJR 1.383 SNIP 1.654
Scopus rating (2001): SJR 1.496 SNIP 1.661
Scopus rating (2000): SJR 1.279 SNIP 1.236
Scopus rating (1999): SJR 2.159 SNIP 1.225
Original language: English
ASJC Scopus subject areas: Atomic and Molecular Physics, and Optics, Electronic, Optical and Magnetic Materials, Computer Vision and Pattern Recognition

**Van der Waals interactions are critical in Car-Parrinello molecular dynamics simulations of porphyrin-fullerene dyads**
The interplay between electrostatic and van der Waals (vdW) interactions in porphyrin-C$_{60}$ dyads is still under debate despite its importance in influencing the structural characteristics of such complexes considered for various applications in molecular photovoltaics. In this article, we sample the conformational space of a porphyrin-C$_{60}$ dyad using Car-Parrinello molecular dynamics simulations with and without empirical vdW corrections. Long-range vdW interactions, which are poorly described by the commonly used density functional theory functionals, prove to be essential for a proper dynamics of the dyad moieties. Inclusion of vdW corrections brings porphyrin and C$_{60}$ close together in an orientation that is in agreement with experimental observations. The structural differences arising from the vdW corrections are shown to be significant for several properties and potentially less important for others. Additionally, our Mulliken population analysis reveals that contrary to the common belief, porphyrin is not the primary electron donating moiety for C$_{60}$. In the considered dyad, fullerene's affinity for electrons is primarily satisfied by charge transfer from the amide group of the linker. However, we show that in the absence of another suitable bound donor, C$_{60}$ can withdraw electrons from porphyrin...
VECSELs: Innovative light sources for PDT

Photodynamic therapy (PDT) with porphyrins and red light (610–630 nm) is finding increasing clinical application for both the eradication of relatively small tumors and the palliation of inoperable or obstructive tumors. PDT also shows some promise for the sterilization of the tumor bed after surgical removal of neoplastic masses. Optically pumped vertical external-cavity surface-emitting lasers (VECSELs) appear to be a very innovative and efficient technology in this specific wavelength range. Furthermore, VECSELs are power scalable and wavelength tunable, and are an appealing light source for PDT.
Vector-field Nonlinear Microscopy

General information
State: Published
Ministry of Education publication type: Professional conference proceedings
Organisations: Department of Physics, Research area: Optics, Research group: Nonlinear Optics
Authors: Kauranen, M., Huttunen, M., Mäkitalo, J., Bautista, G.
Number of pages: 2
Pages: 44-45
Publication date: 2015

Host publication information
Title of host publication: 12th Mediterranean Workshop and Topical Meeting on Novel Optical Materials and Applications
Research output: Professional › Conference contribution

Yellow-orange-red VECSELs: Emergence of a compact and versatile laser platform for medical applications: ePoster

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications
Authors: Guina, M., Kantola, E. L., Leinonen, T. P., Penttinen, J., Mordon, S. R.
Publication date: 2015

Host publication information
Title of host publication: 2015 annual conference of the American Society for Laser Medicine & Surgery, Florida, USA.
Bibliographical note
xposter
Research output: Scientific - peer-review › Conference contribution

Yellow-orange semiconductor disk lasers for medical applications

General information
State: Unpublished
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Research group: Ultrafast and intense lasers
Publication date: 2015
Study of second-harmonic generation from CdS nanostructured thin film
We investigate the second-order nonlinear optical properties of a nanostructured cadmium sulfide thin film by optical second-harmonic generation. The relative values of the components of the second-order susceptibility tensor are found to be $1$, $\chi^{\text{xxz}} = 0.14$, $\chi^{\text{zxx}} = 0.07$. 

Mode-locked 1.33 μm semiconductor disk laser with a bismuth-doped fiber amplifier

Ultrasmall microdisk and microring lasers based on InAs/InGaAs/GaAs quantum dots

Multisoliton complexes in fiber lasers
The formation of stationary and non-stationary pulse groups is regularly observed in multiple pulse soliton fiber lasers. The environment developed in this study for the flexible investigation of this phenomenon is based on the cavity comprising a semiconductor saturable absorber mirror (SESAM) with complex dynamics of absorption recovery and all-fiber dispersion management. The detailed experimental and theoretical considerations show that multiple pulsing in fiber systems offers numerous embodiments ranging from stationary bound states to chaotic bunches. The pulse interaction through the dispersive waves was found to produce a principal impact on the bound state formation. The stability and transformation of stationary bound states and bunch propagation have been also addressed. (C) 2014 Elsevier Inc. All rights reserved.
Nematic liquid crystals: An excellent playground for nonlocal nonlinear light localization in soft matter

The study of optical spatial solitons in nematic liquid crystals (NLC) has greatly improved the understanding of light localization in reorientational nonlocal media. We report some of the latest progress with reference to bright and dark solitary waves in NLC, bright and dark nematicons, discussing models and methods for their description and simulation. We give an account of exact and approximate solutions, as well as nematicon bistability.
Spatial routing with light-induced waveguides in uniaxial nematic liquid crystals

In reorientational soft-matter with uniaxial character, such as nematic liquid crystals (NLCs), self-confined beams into spatial optical solitons are graded-index waveguides subject to birefringent walkoff. We investigate a router to be realized in a planar cell with an inhomogeneous distribution of the optic axis. Based on the input beam position, the proposed demultiplexer can direct the soliton and the copolarized guided-wave signal(s) to various output ports, enhancing the transverse separation of the exit channels and therefore minimizing crosstalk. Both the soliton and the signal(s) maintain their phasefronts normal to launch and exit wavevectors, allowing for excellent coupling into output channels/fibers at the device exit.
Steering of optical solitary waves by coplanar low power beams in reorientational media

The interaction of solitary waves in a nematic liquid crystal (NLC) with a coplanar low power optical beam is investigated. The emphasis of the study is on the control of the solitary wave trajectory by the low power beam and the transfer of momentum between the beams. The results of numerical studies are confirmed by a theoretical analysis of this momentum transfer. The implications for all-optical signal control are discussed.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Frontier Photonics, Univ Nacl Autonoma Mexico, Universidad Nacional Autonoma de Mexico, Inst Invest Mat, Univ Nacl Autonoma Mexico, Universidad Nacional Autonoma de Mexico, Inst Invest Matemat Aplicadas & Sistemas, Dept Math & Mech, Fenomenos Nonlineales & Mecan FENOMEC, Univ Edinburgh, Heriot Watt University, University of Edinburgh, Maxwell Inst Math Sci
Authors: Sciberras, L. W., Minzoni, A. A., Smyth, N. F., Assanto, G.
Number of pages: 19
Publication date: Dec 2014
Peer-reviewed: Yes

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Journal: Journal of Nonlinear Optical Physics and Materials
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ISSN (Print): 0218-8635
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Scopus rating (2015): SJR 0.265 SNIP 0.507 CiteScore 0.67
Scopus rating (2014): SJR 0.272 SNIP 0.352 CiteScore 0.59
Scopus rating (2013): SJR 0.299 SNIP 0.359 CiteScore 0.58
Scopus rating (2012): SJR 0.302 SNIP 0.331 CiteScore 0.55
Scopus rating (2011): SJR 0.243 SNIP 0.208 CiteScore 0.42
Scopus rating (2010): SJR 0.354 SNIP 0.382
Scopus rating (2009): SJR 0.351 SNIP 0.368
Scopus rating (2008): SJR 0.413 SNIP 0.393
Scopus rating (2007): SJR 0.283 SNIP 0.415
Effect of absorption recovery in bismuth-doped silica glass at 1450 nm on soliton grouping in fiber laser

Saturable absorption in bismuth-doped glasses was found to have a noticeable influence on soliton interaction and group formation. This phenomenon, observed in 1450 nm mode-locked bismuth-doped fiber laser, shows the distinct feature of the multiple pulse regime, which appears as a stationary pulse group whose length can be spread over the whole cavity length by variation of the pump power and polarization. Pulse positioning within the ensemble depends on the saturation fluence and the relatively fast recovery dynamics of bismuth fiber.

Microscopic determination of second-order nonlinear optical susceptibility tensors

We demonstrate a microscopy technique that extracts tensorial information about the second-order nonlinear optical susceptibility and hyperpolarizability of molecular materials. Our technique is based on polarization-dependent second-harmonic generation and a genetic algorithm, using which the best possible match with the measured data, and the
possible susceptibility tensor components are found. In contrast to existing techniques, which access only the magnitude of the nonlinear response, our technique also provides information about the phase of the tensor components, which is associated with molecular resonances. After verifying the technique using simulated model structures with well-known symmetries, we demonstrate its capabilities using model surface samples consisting of single purple membrane (PM) fragments of bacteriorhodopsin (bR) chromoproteins. Since the supramolecular structures of PM, bR, and photoactive retinal molecules are known, complex-valued tensorial information on the molecular hyperpolarizabilities can also be extracted. Our technique opens new possibilities for obtaining detailed structural information on biomolecular samples with microscopic resolution.

**General information**

State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research group: Nonlinear Optics, Research area: Optics, Department of Physics, Frontier Photonics
Authors: Naskali, L., Huttunen, M., Virkki, M., Bautista, G., Der, A., Kauranen, M.
Number of pages: 6
Pages: 26409-26414
Publication date: 31 Oct 2014
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Volume: 118
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ISSN (Print): 1932-7447
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Scopus rating (2016): CiteScore 4.48 SJR 1.948 SNIP 1.181
Scopus rating (2015): SJR 1.917 SNIP 1.268 CiteScore 4.68
Scopus rating (2014): SJR 2.027 SNIP 1.448 CiteScore 5.08
Scopus rating (2013): SJR 2.134 SNIP 1.439 CiteScore 5.14
Scopus rating (2012): SJR 2.514 SNIP 1.46 CiteScore 4.98
Scopus rating (2011): SJR 2.32 SNIP 1.457 CiteScore 4.92
Scopus rating (2010): SJR 2.438 SNIP 1.356
Scopus rating (2009): SJR 2.128 SNIP 1.417
Scopus rating (2008): SJR 1.856 SNIP 1.033
Original language: English
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**Bibliographical note**

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Source: researchoutputwizard
Source-ID: 1125
Research output: Scientific › peer-review › Article

**Wavelength Extension of Visible VECSELs by Structural Engineering**

Optically-pumped vertical external-cavity surface-emitting lasers (VECSELs), also called semiconductor disk lasers, are versatile laser devices that are capable of emitting high output powers in a circular, low-divergence beam at emission wavelengths adjustable by the semiconductor gain medium. This unique combination of laser characteristics makes the VECSEL a desirable laser source for various applications ranging from biophotonics and spectroscopy to laser projection. Although VECSELs can emit fundamentally in a wide spectral range, the visible part of the electromagnetic spectrum cannot be fully accessed with direct VECSEL emission. This is due to lack of suitable gain and substrate materials as well as cost-effective pump lasers that are able to emit high optical powers. Thus, the wavelengths below 630 nm have to be generated typically via nonlinear frequency conversion. This thesis is concerned with the development of VECSEL technology enabling extension of the emission range in the visible part of the spectrum, particularly in the yellow-orange (around 560–590 nm) range and at the red wavelength of 675 nm. Yellow-orange light is generated via frequency doubling near-infrared radiation emitted by GaInAs/GaAsP/GaAs VECSELs, whereas red light is directly generated from a GaInP/AlGaInP/GaAs VECSEL. The thesis reveals the design and growth procedures utilized to obtain high-quality GaInAs/GaAsP/GaAs VECSEL gain medium, and reports the first demonstration of a passively mode-locked GaInP/AlGaInP/GaAs VECSEL emitting at 675 nm. The use of reduced growth temperature and addition of strain compensation are shown to be effective methods in obtaining high quality GaInAs/GaAsP/GaAs gain mirrors. Consequently, over 20 W of frequency-doubled emission has been reached with the GaInAs/GaAsP/GaAs gain mirrors in subsequent studies.
Direct laser writing of photostable fluorescent silver nanoclusters in polymer films

Metal nanoclusters consist of a few to a few hundred atoms and exhibit attractive molecular properties such as ultrasmall size, discrete energy levels, and strong fluorescence. Although patterning of these clusters down to the micro- or nanoscale could lead to applications such as high-density data storage, it has been reported only for inorganic matrices. Here we present submicron-scale mask-free patterning of fluorescent silver nanoclusters in an organic matrix. The nanoclusters were produced by direct laser writing in poly(methacrylic acid) thin films and exhibit a broadband emission at visible wavelengths with photostability that is superior to that of Rhodamine 6G dye. This fabrication method could open new opportunities for applications in nanophotonics like imaging, labeling, and metal ion sensing. We foresee that this method can be further applied to prepare other metal nanoclusters embedded in compositionally different polymer matrices.

Direct laser writing of photostable fluorescent silver nanoclusters in polymer films

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Polarized THG Microscopy Identifies Compositionally Different Lipid Droplets in Mammalian Cells

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research group: Nonlinear Optics, Research area: Optics, Department of Physics, Frontier Photonics
Authors: Bautista, G., Pfisterer, S. G., Huttunen, M. J., Ranjan, S., Kanerva, K., Ikonen, E., Kauranen, M.
Number of pages: 7
Pages: 2230-2236
Publication date: 10 Oct 2014
Peer-reviewed: Yes

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Issue number: 10
ISSN (Print): 1542-0086
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Scopus rating (2016): SJR 1.946 SNIP 1.018 CiteScore 3.06
Scopus rating (2015): SJR 2.145 SNIP 1.173 CiteScore 3.3
Scopus rating (2014): SJR 2.203 SNIP 1.166 CiteScore 3.33
Scopus rating (2013): SJR 2.229 SNIP 1.165 CiteScore 3.64
Scopus rating (2012): SJR 2.343 SNIP 1.154 CiteScore 3.57
Scopus rating (2011): SJR 2.322 SNIP 1.204 CiteScore 3.75
Scopus rating (2010): SJR 2.646 SNIP 1.303
Scopus rating (2009): SJR 2.953 SNIP 1.361
Scopus rating (2008): SJR 3.222 SNIP 1.416
Scopus rating (2007): SJR 3.119 SNIP 1.422
Scopus rating (2006): SJR 2.807 SNIP 1.416
Scopus rating (2005): SJR 2.659 SNIP 1.403
Scopus rating (2004): SJR 2.494 SNIP 1.491
Scopus rating (2003): SJR 2.617 SNIP 1.428
Scopus rating (2002): SJR 2.508 SNIP 1.45
Scopus rating (2001): SJR 2.428 SNIP 1.386
Scopus rating (2000): SJR 2.603 SNIP 1.395
Scopus rating (1999): SJR 2.775 SNIP 1.437
Original language: English
DOIs:
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Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2014-12-15
Source: researchoutputwizard
Source-ID: 156
Research output: Scientific - peer-review › Article
How mono-valent cations bend peptide turns and a first-principles database of amino acids and dipeptides

In this contribution we detail our efforts to investigate the structural effects of cations binding to peptides and amino acids. We perform first-principles studies employing long-range dispersion-corrected approximate density-functional theory and compare to gas-phase experiments.

Membrane-associated proteins do care about lipids - perspective based on atomistic molecular dynamics simulations

This thesis consists of three original articles that deal with lipid-protein interactions investigated using atomistic molecular dynamics simulations method, which in some cases were complemented with experimental data. Since very few molecular details of these important interactions are known, the data shown in this thesis can help to understand and develop a broader view on the role of lipids in protein's function. In the first part of this thesis, the membrane-binding part of the COMT protein was studied using the atomistic molecular dynamics simulations. The results indicate that the role of the transmembrane helix and the linker part of this protein is to enclose the enzymatic part of the protein in the close vicinity of the membrane, and therefore to keep it in the specific membrane-water interface environment. Moreover, the particular kind of protein fold, which includes a specific salt bridge in the linker part of the protein, was found in almost all of the simulations, and this information was evaluated further to reveal that this can be the general folding motif for all similar proteins that possess one transmembrane helix and a short linker part that joins it with the rest of the protein. By continuation of the urge to explain the role of the membrane in enzymatic function of COMT, another idea was also investigated: namely, the suggestion that ligands for that enzyme might have different characteristics in regard to their affinity to how the membrane was evaluated, to check whether the membrane binding part of COMT role is indeed meant to make it more accessible to those ligands which stay close to the membrane. This idea was studied with the atomistic molecular dynamics simulations where two COMT ligands—dopamine and L-dopa—were simulated with the membranes of various compositions, and furthermore the results were validated by experiments. The data from that study was consistent with the suggested idea of preferential binding of some ligands to lipids, but also this finding has been shown to have more possible implications for the neurotransmission process and other highly important physiological processes. The second part of this work focuses on the role of cholesterol in hydrophobic matching of peptides and the resulting sorting of transmembrane peptides according to their hydrophobic length. Experimental data from collaborating team suggested that under negative mismatch and the presence of cholesterol in membranes, peptides could laterally sort. Nevertheless, molecular mechanisms of that were unclear. Atomistic molecular dynamics simulations performed for this part of the thesis revealed that cholesterol increases the significance of the negative hydrophobic mismatch, and thus it shifts preference of proteins in such conditions to cluster into domains to minimize the mismatch. In the second part of this study, extended atomistic molecular dynamics simulations showed that cholesterol has a preference to stay in the vicinity of the peptide under negative mismatch when compared to a positive mismatch case. Even more strikingly, cholesterol orientates around the negatively mismatched peptide in a special geometrical configuration with its rough side exposed in
the direction of peptide. In summation, studies for this work demonstrated a view on some aspects of the lipid-protein interactions at the molecular level retrieved through the atomistic molecular dynamics simulations. Importantly, many of the aspects presented here were validated with experiments or suggested explanation for the phenomena observed beforehand by experimental methods. Certainly, lipids are important for the function of proteins, and as it is shown in this thesis, joining experimental and computational approach is a very good way to understand this complicated interplay better and to provide atomistic details of these dynamic processes.

**General information**

State: Published
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Organisations: Research area: Computational Physics, Research group: Biological Physics and Soft Matter, Department of Physics
Authors: Orlowski, A.
Number of pages: 83
Publication date: 6 Oct 2014

**Publication information**

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Original language: English

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**Bibliographical note**

Awarding institution: Tampere University of Technology
Source: researchoutputwizard
Source-ID: 1196
Research output: Collection of articles › Doctoral Thesis

**Computational Modeling of Functional Gold Nanoparticles in Biological Environment**

This work focuses on exploring the properties and functions of charged monolayer-protected gold nanoparticles (AuNPs) in biologically relevant environments by use of atomic-scale molecular dynamics (MD) simulations.

The use of nanoparticles (NPs) in modern technology has been increasing rapidly during the last few years. NPs of different kinds have already been employed, e.g., in nanomedicine as cancer treatments, cleaning agents, cosmetics and new materials for industrial purposes. AuNPs are one type of nanoagents that are being employed for such purposes, and according to recent experimental findings they may have cytotoxic properties. In particular, AuNPs of 2-nm diameter or less are known to permeate through plasma membranes and induce cell death. Hence, studying potential harmful effects of AuNPs is of importance. Understanding the interaction between NPs and cell membranes is relevant also because all trafficking between the cell interior and extracellular space takes place through the cell membrane.

The first study concentrated on the properties of AuNPs in aqueous solution at physiological temperature (310 K). The results showed that electrostatic properties modulate the formation of a complex comprised of the AuNP together with surrounding ions and water, and suggested that electrostatics is one of the central factors in the complexation of AuNPs with other nanomaterials and biological systems. The results highlighted the importance of long-range electrostatic interactions in determining NP properties in aqueous solutions. This observation was concluded to indicate an important role in the interplay between NPs and lipid membranes, which surround cells.

The second part of the research comprises of studying AuNPs in the presence of model cell membranes. The binding of AuNP and membrane reorganization processes were discovered to be governed by co-operative effects where AuNP, counter ions, water and membrane all contribute. The results suggest that a permeation of a cationic AuNP takes place through pore-formation with partial NP neutralization, leading to membrane disruption at higher NP concentrations. The results also suggested a potential mechanism for cytotoxicity as cationic AuNP binding to the extracellular leaflet may trigger apoptosis through translocation of phophatidylinerseine.

Summa summarum, the work presented here provides novel aspects on the interactions of functional AuNPs on cellular level by means of atomistic MD simulation.
Vedyn Stark-ilmion ja polarisoituvuuksien mallintaminen polkuintegraali-Monte Carlo-menetelmällä

Generation and Interaction of Dissipative Solitons in Fiber Lasers

This thesis presents the study of various fiber gain materials, new laser operating regimes and pulse dynamics in mode-locked fiber lasers. Consideration was paid primarily to investigation of energy level transition in Bi-doped alumosilicate- and phosphosilicate-core fibers as promising gain media for mode-locked fiber lasers and amplifiers. The first experimental evidence of dissipative dispersion-managed soliton was obtained on basis of Tm-Ho-doped fiber laser. The role of laser cavity parameters on dissipative soliton interaction was experimentally investigated in mode-locked fiber lasers operated at different wavelengths. The energy transition in bismuth-doped alumosilicate- and phosphosilicate-core fibers was examined using the spectroscopy of transient oscillations at room and liquid-nitrogen temperatures. Bi-doped alumosilicate fiber provides luminescence at the 1.18 μm wavelength band, while Bi-doped phosphosilicate fiber emits at 1.32 μm. The study revealed three-level transition at room temperature and a four-level system at liquid-nitrogen temperature at the 1.18 μm wavelength range. The long-wavelength range, 1.32 μm, operates via four-level transition scheme at room temperature. The new mode-locked fiber laser regime was experimentally demonstrated in a Tm-Ho-doped fiber laser cavity operated at 2 μm. The dissipative dispersion-managed solitons, emitted by the laser in the normal net cavity dispersion regime, exhibited superior performance compared to dispersion-managed solitons in anomalous dispersion in the same cavity. A detailed analysis of pulse dynamics in the mode-locked fiber laser was performed. Under thorough control of the laser parameters, the different soliton groups were obtained: bound solitons, bunch of solitons, soliton rains. Parameters affecting soliton interaction include the recovery dynamics of the saturable absorber, the recovery dynamics of the gain medium, net cavity dispersion, nonlinearity, the sign of gain medium dispersion.

General information
State: Published
Ministry of Education publication type: G5 Doctoral dissertation (article)
Organisations: Optoelectronics Research Centre
Authors: Gumenyuk, R.
Number of pages: 64
Publication date: 11 Jul 2014

Publication information
Place of publication: Tampere
Publisher: Tampere University of Technology
Original language: English

Publication series
Name: Tampere University of Technology. Publication
Publisher: Tampere University of Technology
Volume: 1221
ISSN (Print): 1459-2045
Electronic versions:
gumenyuk.pdf
Links:

Bibliographical note
Awarding institution:Tampere University of Technology
Source: researchoutputwizard
Source-ID: 377
Research output: Collection of articles › Doctoral Thesis

Experimental Confirmation of Dispersion-free Intensity Optical Coherence Tomography

General information
State: Published
Organisations: Department of Physics, Research area: Optics, Research group: Nonlinear Fiber Optics, Univ Eastern Finland, University of Eastern Finland, Inst Photon
Authors: Ryczkowski, P., Turunen, J., Shirai, T., Friberg, A. T., Genty, G.
Publication date: Jun 2014
Peer-reviewed: Unknown
Research output: Scientific › Paper, poster or abstract

A 1.33 μm picosecond pulse generator based on semiconductor disk mode-locked laser and bismuth fiber amplifier
We demonstrate that a combination of ultrafast wafer bonded semiconductor disk laser and a bismuth-doped fiber amplifier provides an attractive design for high power 1.33 μm tandem hybrid systems. Over 0.5 W of average output power was achieved at a repetition rate of 827 MHz that corresponds to a pulse energy of 0.62 nJ. (C) 2014 Optical
The aim of this thesis is to investigate the advantages of pumping fiber optic oscillators utilizing a special type of lasers – semiconductor disk lasers. Relatively novel semiconductor disk laser technology offers low relative intensity noise levels combined with scalable output power, stable operation and nearly diffraction-limited beam quality valuable for an efficient fiber coupling (70-90%). This pumping technique was applied for optical pumping of fiber lasers. Low-noise fiber Raman amplifier in co-propagation configuration for pump and signal was developed in the 1.3 μm spectral range. A hybrid Raman-bismuth-doped fiber amplifier scheme for an efficient pump light conversion was proposed and demonstrated. Semiconductor disk lasers operating at 1.29 μm and 1.48 μm were used as the pump sources for picosecond Raman fiber
lasers at 1.38 and 1.6 μm. The 1.38 μm passively modelocked Raman fiber laser produced 1.97 ps pulses with a ring cavity configuration. The 1.6 μm linear cavity fiber laser with the integrated SESAM produced 2.7 ps output. A picosecond semiconductor disk laser followed by the ytterbium-erbium fiber amplifier offered supercontinuum generation spanning from 1.35 μm to 2 μm with an average power of 3.5 W. By utilizing a 1.15 μm semiconductor disk laser, a pulsed Ho3+-doped fiber lasers for a 2 μm spectral band were demonstrated. 118 nJ pulses at the repetition rate of 170 kHz and central wavelength of 1907 nm were produced by a holmium fiber laser Q-switched by a carbon nanotube saturable absorber. Sub-picosecond holmium-doped fiber laser modelocked with a broadband carbon nanotube saturable absorber and a SESAM were developed. Using the former saturable absorber, ultrashort pulse operation with the duration of ~ 890 fs in the 2030-2100 nm wavelength range was obtained. The results in the presented dissertation demonstrate the potential of the semiconductor disk laser technology for pumping fiber amplifiers and ultrafast lasers.

Role of cavity dispersion on soliton grouping in a fiber lasers
The effect of cavity dispersion on the dynamics of bound soliton states in a fiber laser has been studied both experimentally and numerically. The mode-locking mechanism in a laser was provided by the frequency-shifted feedback to avoid the influence of soliton attraction that could be induced by saturable absorption. It was found that phase-locked bound solitons are stable for dispersion below the “threshold” value of 0.2 ps/nm which depends on the other cavity parameters. For higher dispersion the bound states collapse resulting in the multiple weakly-interacting soliton regime, circulating randomly within the cavity. (C) 2014 Optical Society of America
1.33 um MOPA system based on ultrafast semiconductor disk laser and bismuth fiber amplifier
2 micrometer in diameter quantum dots microdisc/microring lasers

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Optoelectronics Research Centre
Authors: Karpov, D., Laukkanen, J., Tommila, J., Scirko, Y., Kryzhanovskaya, N., Zhukov, A., Lipovskii, A.
Number of pages: 1
Pages: 55-55
Publication date: 2014

Host publication information
Title of host publication: Optics and Photonics Days 2014, OPD2014 Proceedings, 20-22 May, 2014, Turku, Finland
Publisher: Finnish Optical Society
ISBN (Print): 978-952-12-3055-4

Publication series
Name: Optics and Photonics Days

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2014-10-24<br/>Publisher name: Finnish Optical Society
Source: researchoutputwizard
Source-ID: 668
Research output: Scientific › Conference contribution

50-ps Passively Mode-Locked Red Praseodymium Laser

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Gaponenko, M., Metz, P. W., Härkönen, A., Heuer, A., Leinonen, T., Guina, M., Südmeyer, T., Huber, G., Kränkel, C.
Number of pages: 3
Pages: 1-3
Publication date: 2014

Host publication information
Title of host publication: International conference on advanced solid-state lasers, ASSL 2014, 16-21 November, 2014, Shanghai, China
Publisher: Optical Society of America
ISBN (Print): 978-1-55752-822-3

Publication series
Name: International conference on advanced solid-state lasers
DOIs: 10.1364/ASSL.2014.ATh2A.35

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2014-12-31<br/>Publisher name: Optical Society of America
Source: researchoutputwizard
Source-ID: 331
Research output: Scientific - peer-review › Conference contribution

Absorption recovery dynamics in 2 um GaSb-based SESAMs

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Paajaste, J., Suomalainen, S., Härkönen, A., Griebner, U., Steinmeyer, G., Guina, M.
Number of pages: 6
Active optical fiber and method for fabricating an active optical fiber

General information
State: Published
Ministry of Education publication type: H1 Granted patent
Organisations: Former organisation of the author
Authors: Filippov, V., Chamorovskiy, Y., Okhotnikov, O. G., Pessa, M.
Publication date: 2014

Publication information
Priority date: 30/04/13
Priority number: (21) 12/681 480 PCT-numero: PCT/FI2008/050540
Original language: English

Bibliographical note
julk2012 : Pat.No.: ZL 200880119087.7
Contribution: organisation=orc,FACT1=1
Portfolio EDEND: 2014-12-29
Source: researchoutputwizard
Source-ID: 303
Research output: Scientific › Patent
Aerosol synthesis of silver-silica nanocomposites for second-order nonlinear optics

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Physics, Research area: Aerosol Physics, Department of Materials Science, Research group: Materials Characterization, Optoelectronics Research Centre, Research group: Ultrafast and intense lasers, Research area: Optics, Research group: Nonlinear Optics, Research group: Nonlinear Fiber Optics, Research group: Aerosol Synthesis, Center of Microscopy and Nanotechnology, University of Oulu, P.O. Box 7150, FI-90014, Finland
Publication date: 2014

Host publication information
Title of host publication: Aerosol Technology 2014, June 16-18, 2014, Karlsruhe, Germany

All-fiber, high-power, picosecond Yb double clad tapered fiber amplifier
We demonstrate picosecond all-fiber system utilizing Yb-doped tapered power amplifier. The system is capable of producing 6 ps pulses with average power of 60 W and peak power of 0.4 MW. © 2014 IEEE.

Asymmetric photoelectron momentum distributions due to quantum interference in strong-field ionization by a few-cycle pulse

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Quantum Control and Dynamics, Department of Physics, Computational Science X (CompX)
Authors: Shvetsov-Stilovski, N. I., Räsänen, E., Paulus, G. G., Madsen, L. B.
Number of pages: 10
Atomistic Molecular Dynamics Simulations of Cytochrome bc1, and Epiderm Growth Factor Receptor Proteins

General information
State: Published
Ministry of Education publication type: G4 Doctoral dissertation (monograph)
Organisations: Research area: Computational Physics, Research group: Biological Physics and Soft Matter, Department of Physics
Authors: Kaszuba, K.
Publication date: 2014

Publication information
Publisher: Tampere University of Technology
Original language: English

Publication series
Name: Tampere University of Technology, Publication
Publisher: Tampere University of Technology
Volume: 1271
Atomistic simulations of anionic Au$_{144}$(SR)$_{60}$ nanoparticles interacting with asymmetric model lipid membranes

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Biological Physics and Soft Matter, Research group: Materials and Molecular Modeling, Department of Physics, Computational Science X (CompX)
Authors: Heikkilä, E., Martinez-Seara, H., Gurtovenko, A. A., Vattulainen, I., Akola, J.
Number of pages: 9
Pages: 2852-2860
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Biochimica et Biophysica Acta: Biomembranes
Volume: 1838
Issue number: 11
ISSN (Print): 0005-2736
Ratings:
Scopus rating (2016): CiteScore 3.55 SJR 1.511 SNIP 1.101
Scopus rating (2015): SJR 1.782 SNIP 1.142 CiteScore 3.8
Scopus rating (2014): SJR 1.869 SNIP 1.09 CiteScore 3.64
Scopus rating (2013): SJR 1.592 SNIP 0.975 CiteScore 3.45
Scopus rating (2012): SJR 1.833 SNIP 1.156 CiteScore 3.99
Scopus rating (2011): SJR 1.644 SNIP 1.227 CiteScore 4.17
Scopus rating (2010): SJR 2.179 SNIP 1.291
Scopus rating (2009): SJR 2.152 SNIP 1.298
Scopus rating (2008): SJR 2.035 SNIP 1.123
Scopus rating (2007): SJR 2.021 SNIP 1.158
Scopus rating (2006): SJR 1.922 SNIP 1.212
Scopus rating (2005): SJR 2.037 SNIP 1.231
Scopus rating (2004): SJR 1.5 SNIP 1.147
Scopus rating (2003): SJR 1.401 SNIP 1.115
Scopus rating (2002): SJR 1.594 SNIP 1.228
Scopus rating (2001): SJR 1.509 SNIP 1.053
Scopus rating (2000): SJR 1.089 SNIP 0.907
Scopus rating (1999): SJR 0.95 SNIP 0.841
Original language: English
DOIs:
10.1016/j.bbamem.2014.07.027

Beyond the Born-Oppenheimer approximation with quantum Monte Carlo methods

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Broadband spatiotemporal Gaussian Schell-model pulse trains

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research group: Nonlinear Optics, Research area: Optics, Department of Physics, Frontier Photonics
Authors: Dutta, R., Korhonen, M., Friberg, A., Genty, G., Turunen, J.
Number of pages: 7
Pages: 637-643
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Journal of the Optical Society of America A: Optics Image Science and Vision
Volume: 31
Issue number: 3
ISSN (Print): 1084-7529
Ratings:
Scopus rating (2016): CiteScore 1.54 SJR 0.621 SNIP 1.02
Scopus rating (2015): SJR 0.951 SNIP 1.156 CiteScore 1.61
Scopus rating (2014): SJR 0.906 SNIP 1.339 CiteScore 1.72
Scopus rating (2013): SJR 1.04 SNIP 1.336 CiteScore 1.66
Scopus rating (2012): SJR 1.062 SNIP 1.217 CiteScore 1.65
Scopus rating (2011): SJR 1.098 SNIP 1.486 CiteScore 1.82
Scopus rating (2010): SJR 1.254 SNIP 1.578
Scopus rating (2009): SJR 1.394 SNIP 1.614
Scopus rating (2008): SJR 1.469 SNIP 1.526
Scopus rating (2006): SJR 1.562 SNIP 1.959
Scopus rating (2005): SJR 1.361 SNIP 1.806
Scopus rating (2004): SJR 1.381 SNIP 1.832
Scopus rating (2003): SJR 1.436 SNIP 1.742
Scopus rating (2002): SJR 1.383 SNIP 1.654
Scopus rating (2001): SJR 1.496 SNIP 1.661
Scopus rating (2000): SJR 1.279 SNIP 1.236
Scopus rating (1999): SJR 2.159 SNIP 1.225

Original language: English
DOIs: 10.1364/JOSAA.31.000637

**Bibliographical note**
Contribution: organisation=fys,FACT1=1
Portfolio EDEND: 2014-12-17
Publisher name: Optical Society of America
Source: researchoutputwizard
Source-ID: 271
Research output: Scientific - peer-review › Article

**Carbon nanotube mode-locked vertical external-cavity surface-emitting laser**

**General information**
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre
Authors: Seger, K., Meiser, N., Choi, S., Jung, B., Yeom, D., Rotermund, F., Okhotnikov, O. G., Laurell, F., Pasiskevicius, V.
Number of pages: 7
Pages: 1-7
Publication date: 2014

**Host publication information**
Publisher: SPIE
Article number: 896606
ISBN (Print): 978-0-8194-9879-3

**Publication series**
Name: SPIE conference proceedings
Volume: 8966
ISSN (Print): 0277-786X
ISSN (Electronic): 1996-756X
DOIs: 10.1117/12.2041615

**Bibliographical note**
Invited Paper
Contribution: organisation=orc,FACT1=1
Portfolio EDEND: 2014-08-31
Publisher name: SPIE - International Society for Optical Engineering
Source: researchoutputwizard
Source-ID: 1476
Research output: Scientific - peer-review › Conference contribution

**Cationic Au Nanoparticle Binding with Plasma Membrane-like Lipid Bilayers: Potential Mechanism for Spontaneous Permeation to Cells Revealed by Atomistic Simulations**

**General information**
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Biological Physics and Soft Matter, Research group: Materials and Molecular Modeling, Department of Physics, Computational Science X (CompX)
Chalcopyrite quantum wells and dots in solar-cell applications

Chalcopyrite structures are promising candidates for efficient advanced solar cells in thin-film technology. Here we discuss the nanostructuring approach to thin-film photovoltaics and introduce the benefits and challenges of chalcopyrite materials for that purpose. We focus on chalcopyrite quantum wells and quantum dots by describing in detail the growth procedure as well as the theoretical modeling of the obtained structures. We demonstrate that both quantum wells and dots have, in principle, desirable characteristics for applications in photovoltaics.
Cholesterol level affects surface charge of lipid membranes in saline solution

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Biological Physics and Soft Matter, Department of Physics, Computational Science X (CompX)
Authors: Magarkar, A., Dhawan, V., Kallinteri, P., Viitala, T., Elmowafy, M., Rog, T., Bunker, A.
Number of pages: 5
Pages: 1-5
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Scientific Reports
Volume: 4
Article number: 5005
ISSN (Print): 2045-2322
Ratings:
Scopus rating (2016): CiteScore 4.63 SJR 1.625 SNIP 1.401
Scopus rating (2015): SJR 2.057 SNIP 1.684 CiteScore 5.3
Scopus rating (2014): SJR 2.103 SNIP 1.544 CiteScore 4.75
Scopus rating (2013): SJR 1.886 SNIP 1.51 CiteScore 4.06
Scopus rating (2012): SJR 1.458 SNIP 0.896 CiteScore 2.44
Original language: English
DOIs:
10.1038/srep05005

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2014-09-30<br/>Publisher name: Nature Publishing Group
Source: researchoutputwizard
Source-ID: 985
Research output: Scientific - peer-review › Article

Cholesterol, sphingolipids and glycolipids: What do we know about their role in raft-like membranes?

General information
State: Published
Ministry of Education publication type: A2 Review article in a scientific journal
Organisations: Research area: Computational Physics, Research group: Biological Physics and Soft Matter, Department of Physics, Computational Science X (CompX)
Authors: Rog, T., Vattulainen, I.
Number of pages: 22
Pages: 82-104
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Chemistry and Physics of Lipids
Volume: 184
ISSN (Print): 0009-3084
Ratings:
Scopus rating (2016): CiteScore 2.78 SJR 0.976 SNIP 0.862
Scopus rating (2015): SJR 0.957 SNIP 0.957 CiteScore 2.75
Scopus rating (2014): SJR 0.885 SNIP 1.039 CiteScore 2.62
Co-exposure with fullerene may strengthen health effects of organic industrial chemicals

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Biological Physics and Soft Matter, Department of Physics, Computational Science X (CompX), Multi-scaled biodata analysis and modelling (MultiBAM)
Authors: Lehto, M., Karilainen, T., Rog, T., Cramariuc, O., Vanhala, E., Yornaeus, J., Taberman, H., Jänis, J., Alenius, H., Vattulainen, I., Laine, O.
Number of pages: 24
Pages: 1-24
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: PLoS One
Volume: 9
Issue number: 12
Article number: e114490
ISSN (Print): 1932-6203
Ratings:
Scopus rating (2016): CiteScore 3.11 SJR 1.201 SNIP 1.092
Scopus rating (2015): SJR 1.414 SNIP 1.131 CiteScore 3.32
Scopus rating (2014): SJR 1.545 SNIP 1.141 CiteScore 3.54
Scopus rating (2013): SJR 1.74 SNIP 1.147 CiteScore 3.94
Scopus rating (2012): SJR 1.945 SNIP 1.142 CiteScore 4.15
Scopus rating (2011): SJR 2.369 SNIP 1.23 CiteScore 4.58
Scopus rating (2010): SJR 2.631 SNIP 1.161
Scopus rating (2009): SJR 2.473 SNIP 0.985
Scopus rating (2008): SJR 2.323 SNIP 0.96
Scopus rating (2007): SJR 1.289 SNIP 0.525
Original language: English
DOIs:
10.1016/j.chemphyslip.2014.10.004
Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2014-12-15<br/>Publisher name: Elsevier Ireland Ltd
Source: researchoutputwizard
Source-ID: 1391
Research output: Scientific - peer-review › Review Article
Collective dynamics effect transient subdiffusion of inert tracers in flexible gel networks

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Biological Physics and Soft Matter, Department of Physics
Authors: Godec, A., Bauer, M., Metzler, R.
Number of pages: 13
Pages: 1-13
Publication date: 2014
Peer-reviewed: Yes

Publication Information
Journal: New Journal of Physics
Volume: 16
Article number: 092002
ISSN (Print): 1367-2630

Ratings:
Scopus rating (2016): CiteScore 2.97 SJR 1.788 SNIP 1.031
Scopus rating (2015): SJR 1.938 SNIP 1.047 CiteScore 2.8
Scopus rating (2014): SJR 2.806 SNIP 1.307 CiteScore 2.89
Scopus rating (2013): SJR 2.871 SNIP 1.372 CiteScore 2.77
Scopus rating (2012): SJR 3.352 SNIP 1.533 CiteScore 3.4
Scopus rating (2011): SJR 3.47 SNIP 1.634 CiteScore 3.99
Scopus rating (2010): SJR 3.395 SNIP 1.421
Scopus rating (2009): SJR 3.215 SNIP 1.503
Scopus rating (2008): SJR 2.913 SNIP 1.396
Scopus rating (2007): SJR 2.825 SNIP 1.354
Scopus rating (2006): SJR 2.2 SNIP 1.296
Scopus rating (2005): SJR 1.641 SNIP 1.116
Scopus rating (2004): SJR 1.211 SNIP 1.009
Scopus rating (2003): SJR 1.057 SNIP 0.75
Scopus rating (2002): SJR 0.77 SNIP 0.666
Scopus rating (2001): SJR 1.033 SNIP 0.843
Scopus rating (2000): SJR 1.326 SNIP 1.307
Scopus rating (1999): SJR 0.737 SNIP 0.26
Original language: English
DOI: 10.1088/1367-2630/16/9/092002

Construction of the B88 Exchange-Energy Functional in Two Dimensions

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Quantum Control and Dynamics, Department of Physics, Computational Science X (CompX)
Controlling modulation instability using an incoherent low amplitude seed

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Research group: Nonlinear Optics, Research area: Optics, Department of Physics, Frontier Photonics
Publication date: 2014

Host publication information
Title of host publication: Photonics Europe. Nonlinear Optics and Its Applications VIII and Quantum Optics III
Publisher: SPIE
ISBN (Print): 978-1-62841-084-6

Publication series
Name: SPIE conference proceedings
Volume: 9136
DOIs:
10.1117/12.2049722

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2015-01-22<br/>Publisher name: SPIE - International Society for Optical Engineering
Source: researchoutputwizard
Source-ID: 358
Research output: Scientific - peer-review › Conference contribution
Controlling the synergetic effects in (3-aminopropyl) trimethoxysilane and (3-mercaptopropyl) trimethoxysilane coadsorption on stainless steel surfaces

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Surface Science, Frontier Photonics
Number of pages: 11
Pages: 856-866
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Applied Surface Science
Volume: 317
ISSN (Print): 0169-4332
Ratings:
Scopus rating (2016): CiteScore 3.37 SJR 0.951 SNIP 1.225
Scopus rating (2015): SJR 0.914 SNIP 1.3 CiteScore 3.13
Scopus rating (2014): SJR 0.958 SNIP 1.477 CiteScore 2.96
Scopus rating (2013): SJR 0.965 SNIP 1.488 CiteScore 2.78
Scopus rating (2012): SJR 0.918 SNIP 1.373 CiteScore 2.26
Scopus rating (2011): SJR 0.908 SNIP 1.402 CiteScore 2.27
Scopus rating (2010): SJR 0.924 SNIP 1.141
Scopus rating (2009): SJR 0.842 SNIP 1.023
Scopus rating (2008): SJR 0.899 SNIP 1.087
Scopus rating (2007): SJR 0.795 SNIP 0.945
Scopus rating (2006): SJR 0.852 SNIP 1.052
Scopus rating (2005): SJR 0.679 SNIP 0.946
Scopus rating (2004): SJR 0.964 SNIP 1.126
Scopus rating (2003): SJR 0.988 SNIP 1.027
Scopus rating (2002): SJR 0.921 SNIP 0.954
Scopus rating (2001): SJR 0.841 SNIP 0.796
Scopus rating (2000): SJR 0.866 SNIP 0.772
Scopus rating (1999): SJR 1.064 SNIP 0.907
Original language: English
DOIs:
10.1016/j.apsusc.2014.08.199

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2014-12-31<br/>Publisher name: Elsevier
Source: researchoutputwizard
Source-ID: 1772
Research output: Scientific - peer-review › Article

Critical adsorption of polyelectrolytes onto charged Janus nanospheres

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Biological Physics and Soft Matter, Department of Physics
Authors: de Carvalho, S. J., Metzler, R., Cherstvy, A. G.
Number of pages: 12
Pages: 15539-15550
Publication date: 2014
Peer-reviewed: Yes
Deep levels in 1 eV bandgap dilute nitride antimonide solar cells

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre
Authors: Polojärvi, V., Tukiainen, A., Aho, A., Raappana, M., Aho, T., Schramm, A., Guina, M.
Number of pages: 3
Pages: 1-3
Publication date: 2014

Host publication information
Title of host publication: Proceedings of the 29th European Photovoltaic Solar Energy Conference and Exhibition, EU PVSEC 2014, September 22-26, 2014, Amsterdam, the Netherlands
Publisher: European Environment Agency
ISBN (Print): 3-936338-34-5

Publication series
Name: European photovoltaic solar energy conference

Bibliographical note
Proceedings can be downloaded via EU PVSEC website: https://www.eupvsec-proceedings.com/proceedings/dvd.html

Contribution: organisation=orc,FACT1=1
Portfolio EDEND: 2014-12-16
Publisher name: European Environment Agency
Source: researchoutputwizard
Deformation propagation in responsive polymer network films

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Biological Physics and Soft Matter, Department of Physics
Authors: Ghosh, S. K., Cherstvy, A. G., Metzler, R.
Number of pages: 10
Pages: 1-9
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Journal of Chemical Physics
Volume: 141
Issue number: 7
Article number: 074903
ISSN (Print): 0021-9606
Ratings:
Scopus rating (2016): CiteScore 2.13 SJR 1.073 SNIP 0.755
Scopus rating (2015): SJR 0.953 SNIP 0.767 CiteScore 1.98
Scopus rating (2014): SJR 1.386 SNIP 0.989 CiteScore 2.54
Scopus rating (2013): SJR 1.532 SNIP 1.17 CiteScore 2.95
Scopus rating (2012): SJR 1.787 SNIP 1.118 CiteScore 2.86
Scopus rating (2011): SJR 1.605 SNIP 1.207 CiteScore 3.07
Scopus rating (2010): SJR 1.73 SNIP 1.052
Scopus rating (2009): SJR 2.003 SNIP 1.104
Scopus rating (2008): SJR 2.189 SNIP 1.12
Scopus rating (2007): SJR 2.163 SNIP 1.108
Scopus rating (2006): SJR 2.176 SNIP 1.266
Scopus rating (2005): SJR 2.27 SNIP 1.359
Scopus rating (2004): SJR 2.229 SNIP 1.369
Scopus rating (2003): SJR 2.121 SNIP 1.322
Scopus rating (2002): SJR 2.256 SNIP 1.341
Scopus rating (2001): SJR 2.381 SNIP 1.362
Scopus rating (2000): SJR 2.576 SNIP 1.423
Scopus rating (1999): SJR 2.133 SNIP 1.419
Original language: English
DOIs:
10.1063/1.4893056

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2014-12-04<br/>Publisher name: American Institute of Physics
Source: researchoutputwizard
Source-ID: 342
Research output: Scientific - peer-review › Article

Dehydroergosterol as an Analogue for Cholesterol: Why It Mimics Cholesterol So Well - or Does It?

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Biological Physics and Soft Matter, Department of Physics, Computational Science X (CompX), Multi-scaled biodata analysis and modelling (MultiBAM)
Authors: Pourmousa, M., Rog, T., Mikkeli, R., Vattulainen, I., Solanko, L. M., Wustner, D., Holmgaard List, N., Kongsted, J., Karttunen, M.
Determination of the functionality of monolayers of aminopropyl trimethoxy silane and mercaptopropyl trimethoxy silane on stainless steel with SR-PES and chemical derivatization

General information
State: Published
Ministry of Education publication type: B2 Part of a book or another research book
Organisations: Optoelectronics Research Centre, Research group: Surface Science
Authors: Vuori, L., Hannula, M., Hirsimäki, M., Tönisoo, A., Nömmiste, E., Valden, M.
Number of pages: 2
Pages: 1-2
Publication date: 2014

Host publication information
Place of publication: Lund, Sweden
Publisher: MAX-LAB
Links: https://www.maxlab.lu.se/node/1913

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2014-12-08<br/>Publisher name: American Physical Society
Source: researchoutputwizard
Source-ID: 1405
Research output: Scientific › peer-review › Article

Dirac physics in flakes of artificial graphene in magnetic fields

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Quantum Control and Dynamics, Department of Physics, Computational Science X (CompX)
Efficiency of dispersive wave generation by cascaded four-wave mixing

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Research group: Nonlinear Optics, Research area: Optics, Department of Physics, Frontier Photonics
Authors: Webb, K., Erkintalo, M., Xu, Y., Genty, G., Dudley, J., Murdoch, S.
Publication date: 2014

Host publication information
Title of host publication: Conference on lasers and electro-optics , CLEO: Science and Innovations, CLEO_SI 2014, San Jose, CA, United States, 8-13 June 2014
Publisher: Optical Society of American (OSA)
Article number: SW11.5
ISBN (Print): 978-155752999-2
DOIs: 10.1364/CLEO_SI.2014.SW11.5

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2015-01-22<br/>Publisher name: Optical Society of American (OSA)
Source: researchoutputwizard
Source-ID: 1792
Research output: Scientific - peer-review › Conference contribution

Efficiency of dispersive wave generation from a dual-frequency beat signal

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research group: Nonlinear Optics, Research area: Optics, Department of Physics, Frontier Photonics
Authors: Webb, K., Erkintalo, M., Xu, Y., Genty, G., Murdoch, G.
Number of pages: 4
Pages: 5850-5853
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Optics Letters
Volume: 39
Issue number: 20
ISSN (Print): 0146-9592
Ratings:
Scopus rating (2016): CiteScore 3.54 SJR 1.864 SNIP 1.658
Scopus rating (2015): SJR 2.142 SNIP 1.642 CiteScore 3.53
Scopus rating (2014): SJR 2.497 SNIP 2.056 CiteScore 3.86
Scopus rating (2013): SJR 2.458 SNIP 2.095 CiteScore 3.95
Scopus rating (2012): SJR 2.596 SNIP 1.95 CiteScore 3.52
Scopus rating (2011): SJR 2.518 SNIP 2.475 CiteScore 3.69
Scopus rating (2010): SJR 2.669 SNIP 2.293
Scopus rating (2009): SJR 3.167 SNIP 2.665
Scopus rating (2008): SJR 3.408 SNIP 2.378
Scopus rating (2007): SJR 3.489 SNIP 2.102
Scopus rating (2006): SJR 3.143 SNIP 2.334
Scopus rating (2005): SJR 3.251 SNIP 2.483
Scopus rating (2004): SJR 3.521 SNIP 2.718
Scopus rating (2003): SJR 3.708 SNIP 2.573
Efficient dispersive wave generation by a four-wave mixing cascade

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Research group: Nonlinear Optics, Research area: Optics, Department of Physics, Frontier Photonics
Authors: Webb, K., Erkintalo, M., Xu, Y., Genty, G., Dudley, J., Murdoch, S.
Number of pages: 2
Pages: 662-663
Publication date: 2014

Host publication information
Title of host publication: 2014 OptoElectronics and Communication Conference and Australian Conference on Optical Fibre Technology, 6-10 July 2014, Melbourne, VIC
Publisher: Institute of Electrical and Electronics Engineers IEEE
ISBN (Print): 978-1-922107-21-3

Electron magneto-tunneling through single self-assembled InAs quantum dashes

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Quantum Control and Dynamics, Department of Physics, Computational Science X (CompX)
Authors: Shibata, K., Pascher, N., Luukko, P. J. J., Räsänen, E., Schnez, S., Ihn, T., Ensslin, K., Hirakawa, K.
Number of pages: 4
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Applied Physics Express
Volume: 7
Issue number: 4
Article number: 045001
ISSN (Print): 1882-0778

Ratings:
Scopus rating (2016): CiteScore 2.08 SJR 0.812 SNIP 0.981
Scopus rating (2015): SJR 0.752 SNIP 0.82 CiteScore 1.83
Scopus rating (2014): SJR 1.248 SNIP 1.166 CiteScore 1.91
Scopus rating (2013): SJR 1.474 SNIP 1.369 CiteScore 1.8
Enforcing symmetries in boundary element formulation of plasmonic and second-harmonic scattering problems

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research group: Nonlinear Optics, Research area: Optics, Department of Electrical Engineering, Department of Physics, Frontier Photonics
Authors: Mäkitalo, J., Suuriniemi, S., Kauranen, M.
Number of pages: 12
Pages: 2821-2832
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Journal of the Optical Society of America A: Optics Image Science and Vision
Volume: 31
Issue number: 12
ISSN (Print): 1084-7529
Ratings:
Scopus rating (2016): CiteScore 1.54 SJR 0.621 SNIP 1.02
Scopus rating (2015): SJR 0.951 SNIP 1.156 CiteScore 1.61
Scopus rating (2014): SJR 0.906 SNIP 1.339 CiteScore 1.72
Scopus rating (2013): SJR 1.04 SNIP 1.336 CiteScore 1.66
Scopus rating (2012): SJR 1.062 SNIP 1.217 CiteScore 1.65
Scopus rating (2011): SJR 1.098 SNIP 1.486 CiteScore 1.82
Scopus rating (2010): SJR 1.254 SNIP 1.578
Scopus rating (2009): SJR 1.394 SNIP 1.614
Scopus rating (2008): SJR 1.469 SNIP 1.526
Scopus rating (2006): SJR 1.562 SNIP 1.959
Scopus rating (2005): SJR 1.361 SNIP 1.806
Scopus rating (2004): SJR 1.381 SNIP 1.832
Scopus rating (2003): SJR 1.436 SNIP 1.742
Enhancement mechanisms for the nonlinear optical response of metamaterials

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Research group: Nonlinear Optics, Research area: Optics, Department of Physics, Frontier Photonics
Authors: Kauranen, M., Czaplicki, R., Husu, H., Mäkitalo, J., Siikanen, R., Lehtolahti, J., Laukkanen, J., Kuittinen, M.
Number of pages: 3
Pages: 160-162
Publication date: 2014

Host publication information
Title of host publication: 8th International Congress on Advanced Electromagnetic Materials in Microwaves and Optics – Metamaterials 2014 Copenhagen, Denmark, 25-30 August 2014
ISBN (Print): 978-1-4799-3450-8
DOIs:
10.1109/MetaMaterials.2014.6948631

Bibliographical note
Contribution: organisation=fys,FACT1=0.7
Portfolio EDEND: 2014-12-15
Publisher name: Optical Society of America
Source: researchoutputwizard
Source-ID: 1011
Research output: Scientific - peer-review › Article

Enzymatic oxidation of cholesterol: Properties and functional effects of cholestenone in cell membranes

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Biological Physics and Soft Matter, Department of Physics, Computational Science X (CompX)
Authors: Neuvonen, M., Manna, M., Mokkila, S., Javanainen, M., Rog, T., Liu, Z., Bittman, R., Vattulainen, I., Ikonen, E.
Number of pages: 13
Published date: 2014
Peer-reviewed: Yes

Publication information
Journal: PLoS One
Volume: 9
Issue number: 8
Article number: e103743
ISSN (Print): 1932-6203
Ratings:
Scopus rating (2016): CiteScore 3.11 SJR 1.201 SNIP 1.092
Scopus rating (2015): SJR 1.414 SNIP 1.131 CiteScore 3.32
Scopus rating (2014): SJR 1.545 SNIP 1.141 CiteScore 3.54
Erbium-doped fiber laser mode-locked by aligned single-walled carbon nanotubes

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Optoelectronics Research Centre, Research group: Ultrafast and intense lasers
Authors: Noronen, T., Tian, Y., Renaud, O., Kauppinen, E., Nasibulin, A., Gumenyuk, R., Okhotnikov, O. G.
Number of pages: 1
Pages: 57-57
Publication date: 2014

Host publication information
Title of host publication: Optics and Photonics Days 2014, OPD2014 Proceedings, 20-22 May, 2014, Turku, Finland
Publisher: Finnish Optical Society
ISBN (Print): 978-952-12-3055-4

Publication series
Name: Optics and Photonics Days

Event horizons in nonlinear optics

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Research group: Nonlinear Optics, Research area: Optics, Department of Physics, Frontier Photonics
Authors: Webb, K., Erkintalo, M., Xu, Y., Broderick, N., Dudley, J., Genty, G., Murdoch, S.
Number of pages: 2
Pages: 658-659
Publication date: 2014

Host publication information
Title of host publication: 2014 OptoElectronics and Communication Conference and Australian Conference on Optical Fibre Technology, 6-10 July 2014, Melbourne, VIC
Publisher: Institute of Electrical and Electronics Engineers IEEE
ISBN (Print): 978-1-922107-21-3

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2014-12-16<br/>Publisher name: Public Library of Science
Source: researchoutputwizard
Source-ID: 1130
Research output: Scientific › peer-review › Article

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2014-10-24<br/>Publisher name: Finnish Optical Society
Source: researchoutputwizard
Source-ID: 1155
Research output: Scientific › Conference contribution

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2015-01-22<br/>Publisher name: Institute of Electrical and Electronics Engineers IEEE
Source: researchoutputwizard
Experimental confirmation of dispersion-free intensity optical coherence tomography

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Research group: Nonlinear Optics, Research area: Optics, Department of Physics, Frontier Photonics
Authors: Ryczkowski, P., Turunen, J., Shirai, T., Friberg, A., Genty, G.
Number of pages: 2
Pages: 1-2
Publication date: 2014

Host publication information
Title of host publication: 2014 16th International Conference on Transparent Optical Networks (ICTON), 6-10 July 2014, Graz
Publisher: IEEE Computer Society
DOIs: 10.1109/ICTON.2014.6876717

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2015-01-22<br/>Publisher name: IEEE Computer Society
Source: researchoutputwizard
Source-ID: 1413
Research output: Scientific - peer-review › Conference contribution

Experimental dynamics of Akhmediev breathers in a dispersion varying optical fiber

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research group: Nonlinear Optics, Research area: Optics, Department of Physics, Frontier Photonics
Authors: Bendahmane, A., Mussot, A., Szriftgiser, P., Zerkak, O., Genty, G., Dudley, J., Kudlinski, A.
Number of pages: 4
Pages: 4490-4493
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Optics Letters
Volume: 39
Issue number: 15
ISSN (Print): 0146-9592
Ratings:
Scopus rating (2016): CiteScore 3.54 SJR 1.864 SNIP 1.658
Scopus rating (2015): SJR 2.142 SNIP 1.642 CiteScore 3.53
Scopus rating (2014): SJR 2.497 SNIP 2.056 CiteScore 3.86
Scopus rating (2013): SJR 2.458 SNIP 2.095 CiteScore 3.95
Scopus rating (2012): SJR 2.596 SNIP 1.95 CiteScore 3.52
Scopus rating (2011): SJR 2.518 SNIP 2.475 CiteScore 3.69
Scopus rating (2010): SJR 2.669 SNIP 2.293
Scopus rating (2009): SJR 3.167 SNIP 2.665
Scopus rating (2008): SJR 3.408 SNIP 2.378
Scopus rating (2007): SJR 3.489 SNIP 2.102
Scopus rating (2006): SJR 3.143 SNIP 2.334
Scopus rating (2005): SJR 3.251 SNIP 2.483
Scopus rating (2004): SJR 3.521 SNIP 2.718
Scopus rating (2003): SJR 3.708 SNIP 2.573
Scopus rating (2002): SJR 3.702 SNIP 2.39
Experimental measurement of supercontinuum second order coherence

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Research group: Nonlinear Optics, Research area: Optics, Department of Physics, Frontier Photonics
Authors: Närhi, M., Korhonen, M., Turunen, J., Friberg, A., Genty, G.
Publication date: 2014

Host publication information
Title of host publication: Conference on lasers and electro-optics, CLEO: Science and Innovations, CLEO_SI 2014, San Jose, CA, United States, 8-13 June 2014
Publisher: Optical Society of American (OSA)
Article number: SW1I.3
ISBN (Print): 978-155752999-2
DOIs:
10.1364/CLEO_SI.2014.SW1I.3

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2014-12-17<br/>Publisher name: Optical Society of America
Source: researchoutputwizard
Source-ID: 163
Research output: Scientific - peer-review › Article

Extreme events in resonant radiation from 3-dimensional light bullets

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Research group: Nonlinear Optics, Department of Physics, Frontier Photonics
Authors: Roger, T., Majus, D., Tamosauskas, G., Dubietis, A., Genty, G., Kolesik, M., Faccio, D.
Publication date: 2014

Host publication information
Title of host publication: Conference on lasers and electro-optics , CLEO: QELS_Fundamental Science, CLEO_QELS 2014, San Jose, CA, United States, 8-13 June 2014
Publisher: Optical Society of American (OSA)
Article number: FW3D.4
ISBN (Print): 978-155752999-2

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2015-01-22<br/>Publisher name: Optical Society of American (OSA) < br/>publication_forum: 71855
Source: researchoutputwizard
Source-ID: 1392
Research output: Scientific - peer-review › Conference contribution
Extreme events in resonant radiation from three-dimensional light bullets

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research group: Nonlinear Optics, Research area: Optics, Department of Physics, Frontier Photonics
Authors: Roger, T., Majus, D., Tamosauskas, G., Panagiotopoulos, P., Kolesik, N., Genty, G., Grazuleviciute, I., Dubietis, A., Faccio, D.
Number of pages: 5
Pages: 1-5
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Physical Review A
Volume: 90
Issue number: 3
Article number: 033816
ISSN (Print): 1050-2947
Ratings:
Scopus rating (2016): CiteScore 2.25 SJR 1.281 SNIP 0.852
Scopus rating (2015): SJR 1.451 SNIP 0.903 CiteScore 2.06
Scopus rating (2014): SJR 2.121 SNIP 1.146 CiteScore 2.46
Scopus rating (2013): SJR 2.317 SNIP 1.179 CiteScore 2.86
Scopus rating (2012): SJR 2.515 SNIP 1.239 CiteScore 2.81
Scopus rating (2011): SJR 2.31 SNIP 1.261 CiteScore 2.79
Scopus rating (2010): SJR 2.403 SNIP 1.22
Scopus rating (2009): SJR 2.475 SNIP 1.305
Scopus rating (2008): SJR 2.559 SNIP 1.241
Scopus rating (2007): SJR 2.618 SNIP 1.259
Scopus rating (2006): SJR 2.342 SNIP 1.257
Scopus rating (2005): SJR 2.017 SNIP 1.286
Scopus rating (2004): SJR 2.168 SNIP 1.1
Scopus rating (2003): SJR 2.05 SNIP 1.078
Scopus rating (2002): SJR 2.037 SNIP 1.191
Scopus rating (2001): SJR 2.204 SNIP 1.521
Scopus rating (2000): SJR 2.494 SNIP 1.33
Scopus rating (1999): SJR 2.696 SNIP 1.366
Original language: English
DOIs:
10.1103/PhysRevA.90.033816

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2014-12-17<br/>Publisher name: American Physical Society
Source: researchoutputwizard
Source-ID: 1393
Research output: Scientific - peer-review › Article

Femtosecond Cr:ZnS laser at 2.35 μm mode-locked by carbon nanotubes

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre
Authors: Tolstik, N., Okhotnikov, O. G., Sorokin, E., Sorokina, I. T.
Number of pages: 6
Pages: 1-6
Publication date: 2014

Host publication information
First-passage statistics for aging diffusion in systems with annealed and quenched disorder

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Biological Physics and Soft Matter, Department of Physics
Authors: Krusemann, H., Godec, A., Metzler, R.
Number of pages: 5
Pages: 1-5
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Physical Review E
Volume: 89
Issue number: 4
Article number: 040101
ISSN (Print): 1539-3755
Ratings:
Scopus rating (2016): CiteScore 1.95 SJR 0.993 SNIP 0.896
Scopus rating (2015): SJR 1.047 SNIP 0.978 CiteScore 1.89
Scopus rating (2014): SJR 1.22 SNIP 1.123 CiteScore 2.05
Scopus rating (2013): SJR 1.311 SNIP 1.239 CiteScore 2.28
Scopus rating (2012): SJR 1.42 SNIP 1.226 CiteScore 2.28
Scopus rating (2011): SJR 1.485 SNIP 1.225 CiteScore 2.28
Scopus rating (2010): SJR 1.69 SNIP 1.215
Scopus rating (2009): SJR 1.694 SNIP 1.259
Scopus rating (2008): SJR 1.96 SNIP 1.314
Scopus rating (2007): SJR 1.926 SNIP 1.332
Scopus rating (2006): SJR 1.787 SNIP 1.324
Scopus rating (2005): SJR 1.71 SNIP 1.302
Scopus rating (2004): SJR 1.672 SNIP 1.214
Scopus rating (2003): SJR 1.303 SNIP 1.166
Scopus rating (2002): SJR 0.936 SNIP 1.241
Scopus rating (2001): SJR 0.709 SNIP 1.429
Scopus rating (2000): SJR 0.299 SNIP 1.252
Scopus rating (1999): SJR 0.381 SNIP 1.232
Original language: English
DOIs:
GaSb-based SESAM Mode-Locked Tm,Ho:KLuW Laser at 2060 nm

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Frontier Photonics
Number of pages: 3
Pages: 1-3
Publication date: 2014

Host publication information
Title of host publication: International conference on advanced solid-state lasers, ASSL 2014, 16-21 November, 2014, Shanghai, China
Publisher: Optical Society of America
ISBN (Print): 978-1-55752-822-3

Publication series
Name: International conference on advanced solid-state lasers
DOIs:
10.1364/ASSL.2014.ATu2A.52

Generation of pulse trains with high-repetition-rate in anomalous dispersion decreasing fibers

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre
Authors: Korobko, D., Okhotnikov, O. G., Sysolyatin, A., Zolotovskii, I.
Number of pages: 1
Pages: 1-1
Publication date: 2014

Host publication information
Title of host publication: 16th International Conference on Laser Optics 2014, June 30 - July 4, 2014, St. Petersburg, Russia
Publisher: IEEE
ISBN (Print): 978-1-4799-3884-1
ISBN (Electronic): 978-1-4799-3885-8

Publication series
Name: International Conference on Laser Optics
DOIs:
10.1109/LO.2014.6886438

Bibliographical note
Poster TuR8-p21
Contribution: organisation=orc,FACT1=1
Portfolio EDEND: 2014-09-30
Publisher name: IEEE
Generation of pulse trains with high-repetition-rate in anomalous dispersion decreasing fibers

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre
Authors: Korobko, D., Okhotnikov, O., Sysolyatin, A., Zolotovskii, I.
Number of pages: 14
Pages: 1-14
Publication date: 2014

Host publication information
Publisher: SPIE
Article number: 89801N
ISBN (Print): 978-0-8194-9893-9

Publication series
Name: SPIE conference proceedings
Volume: 8980
ISSN (Print): 0277-786X
ISSN (Electronic): 1996-756X
DOIs: 10.1117/12.2036331

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2014-08-31<br/>Publisher name: SPIE - International Society for Optical Engineering
Source: researchoutputwizard
Source-ID: 760
Research output: Scientific - peer-review › Conference contribution

Green (In,Ga,Al)P-GaP light-emitting diodes grown on high-index GaAs surfaces

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Ledentsov, N., Shchukin, V., Lyytikäinen, J., Okhotnikov, O., Shernyakov, Y., Payusov, A., Gordeev, N., Maximov, M., Schlichting, S., Nippert, F., Hoffmann, A.
Number of pages: 5
Pages: 1-5
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: APPLIED PHYSICS LETTERS
Volume: 105
Issue number: 18
Article number: 181902
ISSN (Print): 0003-6951
Ratings:
Scopus rating (2016): CiteScore 2.67 SJR 1.132 SNIP 0.996
Scopus rating (2015): SJR 1.085 SNIP 0.983 CiteScore 2.47
Scopus rating (2014): SJR 1.799 SNIP 1.462 CiteScore 3.25
Scopus rating (2013): SJR 2.149 SNIP 1.652 CiteScore 3.77
Scopus rating (2012): SJR 2.554 SNIP 1.754 CiteScore 3.76
Scopus rating (2011): SJR 2.805 SNIP 1.94 CiteScore 4.04
High-accuracy method for sample positioning in tightly focused nonlinear reflectivity measurement systems for semiconductor saturable absorber mirrors

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Optoelectronics Research Centre
Authors: Orsila, L., Hyyti, J., Härkönen, A., Steinmeyer, G., Guina, M.
Number of pages: 1
Pages: 51-51
Publication date: 2014

Host publication information
Title of host publication: Optics and Photonics Days 2014, OPD2014 Proceedings, 20-22 May, 2014, Turku, Finland
Publisher: Finnish Optical Society
ISBN (Print): 978-952-12-3055-4

Publication series
Name: Optics and Photonics Days

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2014-11-11<br/>Publisher name: American Institute of Physics AIP
Source: researchoutputwizard
Source-ID: 903
Research output: Scientific › peer-review › Article

High-efficiency 20 W yellow VECSEL

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Kantola, E., Leinonen, T., Ranta, S., Tavast, M., Guina, M.
Number of pages: 9
Pages: 6372-6380
Publication date: 2014
Peer-reviewed: Yes

Publication information
High-Energy Anomaly in the Angle-resolved Photoemission spectra of Nd2-xCexCuO4: Evidence for a Matrix Element Effect

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Spectroscopies of Complex Materials, Department of Physics, Computational Science X (CompX)
Authors: Rienks, E., Ärrälä, M., Lindroos, M., Roth, F., Tabis, W., Yu, G., Greven, M., Fink, J.
Number of pages: 5
Pages: 1-5
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Physical Review Letters
Volume: 113
Article number: 137001
ISSN (Print): 0031-9007
Ratings:
Scopus rating (2016): CiteScore 6.33 SJR 3.56 SNIP 2.133
Scopus rating (2015): SJR 3.823 SNIP 2.205 CiteScore 5.76
Scopus rating (2014): SJR 5.027 SNIP 2.646 CiteScore 6.62
Scopus rating (2013): SJR 5.674 SNIP 2.796 CiteScore 7.46
Scopus rating (2012): SJR 6.243 SNIP 2.845 CiteScore 7.19
High performance wafer-fused semiconductor disk lasers emitting in the 1300 nm waveband

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Number of pages: 6
Pages: 29398-29403
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Optics Express
Volume: 22
Issue number: 24
ISSN (Print): 1094-4087
Ratings:
Scopus rating (2016): CiteScore 3.48 SJR 1.487 SNIP 1.589
Scopus rating (2015): SJR 1.976 SNIP 1.755 CiteScore 3.78
Scopus rating (2014): SJR 2.349 SNIP 2.166 CiteScore 4.18
Scopus rating (2013): SJR 2.358 SNIP 2.226 CiteScore 4.38
Scopus rating (2012): SJR 2.587 SNIP 2.145 CiteScore 3.85
Scopus rating (2011): SJR 2.579 SNIP 2.606 CiteScore 4.04
Scopus rating (2010): SJR 2.943 SNIP 2.466
Scopus rating (2009): SJR 3.092 SNIP 2.669
Scopus rating (2008): SJR 3.195 SNIP 2.393
Scopus rating (2007): SJR 3.27 SNIP 2.032
Scopus rating (2006): SJR 3.233 SNIP 2.326
Scopus rating (2005): SJR 3.334 SNIP 2.379
Scopus rating (2004): SJR 2.833 SNIP 2.499
Scopus rating (2003): SJR 2.688 SNIP 2.193
Scopus rating (2002): SJR 1.547 SNIP 1.673

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2014-09-30<br/>Publisher name: American Physical Society
Source: researchoutputwizard
Source-ID: 1382
Research output: Scientific - peer-review » Article
High power cavity-adjusted semiconductor disc lasers emitting in the 1310 nm waveband

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Research group: Ultrafast and intense lasers, Frontier Photonics
Authors: Sirbu, A., Rantamäki, A., Iakovlev, V., Mereuta, A., Lyytikäinen, J., Caliman, A., Okhotnikov, O., Kapon, E.
Number of pages: 2
Publication date: 2014

Host publication information
Title of host publication: ISLC 2014, IEEE 24th International Semiconductor Laser Conference, 7 - 10 September, 2014, Mallorca, Spain
Publisher: IEEE
ISBN (Print): 978-1-4799-5721-7

Publication series
Name: IEEE International Semiconductor Laser Conference
DOIs: 10.1109/ISLC.2014.231

Bibliographical note
Oral WA6
Contribution: organisation=orc,FACT1=1
Portfolio EDEND: 2014-09-24
Publisher name: IEEE
Source-ID: 1519
Research output: Scientific - peer-review › Conference contribution

High-power flip-chip semiconductor disk laser in the 1.3. um wavelength band

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Rantamäki, A., Sirbu, A., Saarinen, E. J., Lyytikäinen, J., Mereuta, A., Iakovlev, V., Kapon, E., Okhotnikov, O. G.
Number of pages: 4
Pages: 4855-4858
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Optics Letters
Volume: 39
Issue number: 16
ISSN (Print): 0146-9592
Ratings:
Scopus rating (2016): CiteScore 3.54 SJR 1.864 SNIP 1.658
Scopus rating (2015): SJR 2.142 SNIP 1.642 CiteScore 3.53
Scopus rating (2014): SJR 2.497 SNIP 2.056 CiteScore 3.86
Scopus rating (2013): SJR 2.458 SNIP 2.095 CiteScore 3.95
High power semiconductor disk laser with a semiconductor-dielectric-metal compound mirror

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Ultrafast and intense lasers, Research group: Surface Science, Frontier Photonics
Authors: Rantamäki, A., Saarinen, E. J., Lytytikäinen, J., Lahtonen, K., Valden, M., Okhotnikov, O. G.
Number of pages: 4
Pages: 1-4
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: APPLIED PHYSICS LETTERS
Volume: 104
Issue number: 10
Article number: 101110
ISSN (Print): 0003-6951
Ratings:
Scopus rating (2016): CiteScore 2.67 SJR 1.132 SNIP 0.996
Scopus rating (2015): SJR 1.085 SNIP 0.983 CiteScore 2.47
Scopus rating (2014): SJR 1.799 SNIP 1.462 CiteScore 3.25
Scopus rating (2013): SJR 2.149 SNIP 1.652 CiteScore 3.77
Scopus rating (2012): SJR 2.554 SNIP 1.754 CiteScore 3.76
Scopus rating (2011): SJR 2.805 SNIP 1.94 CiteScore 4.04
Scopus rating (2010): SJR 2.926 SNIP 1.789
Scopus rating (2009): SJR 2.857 SNIP 1.848
Scopus rating (2008): SJR 2.934 SNIP 1.83
Scopus rating (2007): SJR 3.039 SNIP 1.913
Scopus rating (2006): SJR 3.457 SNIP 2.288
Scopus rating (2005): SJR 3.709 SNIP 2.382
Scopus rating (2004): SJR 3.904 SNIP 2.38

Original language: English
DOIs:
10.1364/OL.39.004855

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2014-08-31<br/>Publisher name: Optical Society of America
Source: researchoutputwizard
Source-ID: 1351
Research output: Scientific - peer-review › Article
High Power Wafer-Fused Flip Chip Semiconductor Disk Laser at 1.27 μm

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Research group: Ultrafast and intense lasers, École Polytechnique Fédérale de Lausanne, Laboratory of Physics of Nanostructures, CH-1015 Lausanne, Switzerland
Authors: Rantamäki, A., Sirbu, A., Saarinen, E., Lyytikäinen, J., Iakolev, V., Kapon, E., Okhotnikov, O.
Publication date: 2014

Host publication information
Title of host publication: 6th EPS-QEOD Europhoton Conference, 24-29 August, 2014, Neuchâtel, Switzerland.
Conference Digest: Europhysics Conference Abstract Volume 38 E
ISBN (Print): 2-914771-89-4
Research output: Scientific - peer-review » Conference contribution

How Anacetrapib Inhibits the Activity of the Cholesteryl Ester Transfer Protein? Perspective through Atomistic Simulations

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Biological Physics and Soft Matter, Department of Physics, Computational Science X (CompX)
Authors: Äijänen, T., Koivuniemi, A., Javanainen, M., Rissanen, S., Rog, T., Vattulainen, I.
Number of pages: 14
Pages: 1-14
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: PLOS Computational Biology
Volume: 10
Issue number: 11
Article number: e1003987
ISSN (Print): 1553-7358

Ratings:
Scopus rating (2016): CiteScore 4.41 SJR 3.144 SNIP 1.342
Scopus rating (2015): SJR 3.43 SNIP 1.447 CiteScore 4.69
Scopus rating (2014): SJR 3.359 SNIP 1.44 CiteScore 4.74
Scopus rating (2013): SJR 3.295 SNIP 1.457 CiteScore 4.91
Scopus rating (2012): SJR 3.329 SNIP 1.642 CiteScore 5.36
Scopus rating (2011): SJR 3.381 SNIP 1.603 CiteScore 5.25
Scopus rating (2010): SJR 3.523 SNIP 1.554
Scopus rating (2009): SJR 3.273 SNIP 1.44
Scopus rating (2008): SJR 3.58 SNIP 1.371
Hybrid systems of AlInP microdisks and colloidal CdSe nanocrystals showing whispering-gallery modes at room temperature

We report on the realization of hybrid systems composed of passive optical microdisk resonators prepared from epitaxial layer systems and nanocrystal quantum emitters synthesized by colloidal chemistry. The AlInP disk material allows for the operation in the visible range, as probed by CdSe-based nanocrystals. Photoluminescence spectra at room temperature reveal sets of whispering-gallery modes consistent with finite-difference time-domain simulations. In the experiments, a special sample geometry renders it possible to detect resonant optical modes perpendicular to the disk plane.
Incorporation model of N into GaInNAs alloys grown by radio-frequency plasma-assisted molecular beam epitaxy

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Aho, A., Korpijärvi, V., Tukiainen, A., Puustinen, J., Guina, M.
Number of pages: 6
Pages: 1-6
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Journal of Applied Physics
Volume: 116
Article number: 213101
ISSN (Print): 0021-8979

Ratings:
Scopus rating (2016): CiteScore 1.72 SJR 0.632 SNIP 0.815
Scopus rating (2015): SJR 0.618 SNIP 0.84 CiteScore 1.57
Scopus rating (2014): SJR 1.005 SNIP 1.18 CiteScore 2.04
Scopus rating (2013): SJR 1.165 SNIP 1.317 CiteScore 2.24
Scopus rating (2012): SJR 1.305 SNIP 1.294 CiteScore 2.13
Scopus rating (2011): SJR 1.373 SNIP 1.318 CiteScore 2.24
Scopus rating (2010): SJR 1.47 SNIP 1.195
Scopus rating (2009): SJR 1.518 SNIP 1.238
Scopus rating (2008): SJR 1.667 SNIP 1.338
Scopus rating (2007): SJR 1.708 SNIP 1.395
Scopus rating (2006): SJR 1.947 SNIP 1.649
Scopus rating (2005): SJR 2.034 SNIP 1.627
Scopus rating (2004): SJR 2.097 SNIP 1.602
Scopus rating (2003): SJR 2.019 SNIP 1.525
Scopus rating (2002): SJR 2.225 SNIP 1.674
Scopus rating (2001): SJR 2.079 SNIP 1.554
Scopus rating (2000): SJR 2.338 SNIP 1.543
Scopus rating (1999): SJR 2.071 SNIP 1.517

Original language: English
DOIs: 10.1063/1.4903318

Influence of surface hydroxylation on the oxidation of FeCr in O2 and air

General information
State: Published
Ministry of Education publication type: B2 Part of a book or another research book
Organisations: Optoelectronics Research Centre, Research group: Surface Science
Instabilities, breathers and rogue waves in optics

General information
State: Published
Ministry of Education publication type: A2 Review article in a scientific journal
Organisations: Research group: Nonlinear Optics, Research area: Optics, Department of Physics, Frontier Photonics
Authors: Dudley, J. M., Dias, F., Erkintalo, M., Genty, G.
Number of pages: 10
Pages: 755-764
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Nature Photonics
Volume: 8
Issue number: 10
ISSN (Print): 1749-4885
Ratings:
Scopus rating (2016): SJR 15.831 SNIP 9.983 CiteScore 21.32
Scopus rating (2014): SJR 14.556 SNIP 9.949 CiteScore 17.25
Scopus rating (2013): SJR 13.612 SNIP 9.461 CiteScore 16.32
Scopus rating (2012): SJR 13.418 SNIP 8.003 CiteScore 13.46
Scopus rating (2010): SJR 10.754 SNIP 8.328
Scopus rating (2009): SJR 8.577 SNIP 11.176
Scopus rating (2008): SJR 6.481 SNIP 6.9
Original language: English
DOIs:
10.1038/nphoton.2014.220

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2014-12-17<br/>Publisher name: Nature Publishing Group
Source: researchoutputwizard
Source-ID: 268
Research output: Scientific › peer-review › Review Article

Instability of structural defects generated by electron irradiation in GaInNAs quantum wells

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Pavelescu, E., Dumitrescu, M., Guina, M.
Mixing and segregation of ring polymers: spatial confinement and molecular crowding effects

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Biological Physics and Soft Matter, Department of Physics
Authors: Shin, J., Cherstvy, A., Metzler, R.
Number of pages: 19
Pages: 1-19
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: New Journal of Physics
Volume: 16
Article number: 053047
ISSN (Print): 1367-2630
Ratings:
Scopus rating (2016): CiteScore 2.97 SJR 1.788 SNIP 1.031
Scopus rating (2015): SJR 1.938 SNIP 1.047 CiteScore 2.8
Scopus rating (2014): SJR 2.806 SNIP 1.307 CiteScore 2.89
Molecular Dynamics Simulation of Inverse-Phosphocholine Lipids

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Biological Physics and Soft Matter, Department of Physics, Computational Science X (CompX)
Authors: Magarkar, A., Rog, T., Bunker, A.
Number of pages: 6
Pages: 19444-19449
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Journal of Physical Chemistry C
Volume: 118
Issue number: 33
ISSN (Print): 1932-7447
Ratings:
Scopus rating (2016): CiteScore 4.48 SJR 1.948 SNIP 1.181
Scopus rating (2015): SJR 1.917 SNIP 1.268 CiteScore 4.68
Scopus rating (2014): SJR 2.027 SNIP 1.448 CiteScore 5.08
Scopus rating (2013): SJR 2.134 SNIP 1.439 CiteScore 5.14
Scopus rating (2012): SJR 2.514 SNIP 1.46 CiteScore 4.98
Scopus rating (2011): SJR 2.32 SNIP 1.457 CiteScore 4.92
Scopus rating (2010): SJR 2.438 SNIP 1.356
Scopus rating (2009): SJR 2.128 SNIP 1.417
Scopus rating (2008): SJR 1.856 SNIP 1.033
Original language: English
DOIs:
10.1021/jp505633y

Bibliographical note
**Molecular Dynamics Simulation of PEGylated Membranes with Cholesterol: Building Toward the DOXIL Formulation**

**General information**
State: Published
Organisations: Research area: Computational Physics, Research group: Biological Physics and Soft Matter, Department of Physics, Computational Science X (CompX)
Authors: Magarkar, A., Rog, T., Bunker, A.
Number of pages: 9
Pages: 15541-15549
Publication date: 2014
Peer-reviewed: Yes

**Publication information**
Journal: Journal of Physical Chemistry C
Volume: 118
Issue number: 28
ISSN (Print): 1932-7447

**Ratings:**
Scopus rating (2016): CiteScore 4.48 SJR 1.948 SNIP 1.181
Scopus rating (2015): SJR 1.917 SNIP 1.268 CiteScore 4.68
Scopus rating (2014): SJR 2.027 SNIP 1.448 CiteScore 5.08
Scopus rating (2013): SJR 2.134 SNIP 1.439 CiteScore 5.14
Scopus rating (2012): SJR 2.514 SNIP 1.46 CiteScore 4.98
Scopus rating (2011): SJR 2.32 SNIP 1.457 CiteScore 4.92
Scopus rating (2010): SJR 2.438 SNIP 1.356
Scopus rating (2009): SJR 2.128 SNIP 1.417
Scopus rating (2008): SJR 1.856 SNIP 1.033
Original language: English
DOIs: 10.1021/jp504962m

**Bibliographical note**

**Molecular motors pulling cargos in the viscoelastic cytosol: how power strokes beat subdiffusion**

**General information**
State: Published
Organisations: Research area: Computational Physics, Research group: Biological Physics and Soft Matter, Department of Physics
Authors: Goychuk, I., Kharchenko, V. O., Metzler, R.
Number of pages: 12
Pages: 16524-16535
Publication date: 2014
Peer-reviewed: Yes

**Publication information**
Journal: Physical Chemistry Chemical Physics
Volume: 16
Issue number: 31
ISSN (Print): 1463-9076
**Moth eye antireflection coated GaInP/GaAs/GaInNAs solar cell**

**General information**
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre
Authors: Aho, A., Tommila, J., Tukiainen, A., Polojärvi, V., Niemi, T., Guina, M.
Number of pages: 4
Pages: 33-36
Publication date: 2014

**Host publication information**
Title of host publication: CPV-10 Proceedings, 10th International Conference on Concentrator Photovoltaic Systems, April 7-9, 2014, Albuquerque, NM, USA. AIP Conference Proceedings
Publisher: American Institute of Physics

**Publication series**
Name: AIP Conference Proceedings
Volume: 1616
ISSN (Print): 0094-243X
ISSN (Electronic): 1551-7616
DOIs: 10.1063/1.4897022

**Bibliographical note**
Contribution: organisation=orc,FACT1=1
Portfolio EDEND: 2014-10-08
Publisher name: American Institute of Physics
Source: researchoutputwizard
Source-ID: 59
Research output: Scientific - peer-review › Conference contribution
Multipolar nonlinear properties of silicon nitride films

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Research group: Nonlinear Optics, Research area: Optics, Department of Physics
Authors: Koskinen, K., Czaplicki, R., Kauranen, M.
Number of pages: 1
Pages: 48-48
Publication date: 2014

Host publication information
Editor: Saarinen, J. J.

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2014-11-28
Source: researchoutputwizard
Source-ID: 792
Research output: Scientific › Conference contribution

Multipolar second-harmonic generation from films of chalcogenide glasses

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Research group: Nonlinear Optics, Research area: Optics, Department of Physics, Frontier Photonics
Authors: Slablab, A., Koskinen, K., Czaplicki, R., Karunakaran, N., Sebastian, I., Chandran, P., Kallasnath, M., Radhakrishnan, P., Kauranen, M.
Number of pages: 7
Pages: 1-7
Publication date: 2014

Host publication information
Title of host publication: Nanophotonics V, Brussels, Belgium, April 14, 2014
Publisher: S P I E - International Society for Optical Engineering
Article number: 912621
ISBN (Print): 978-1-62841-074-7

Publication series
Name: Proceedings of SPIE
Volume: 9126
DOIs:
10.1117/12.2051477

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2014-05-27<br/>Publisher name: S P I E - International Society for Optical Engineering
Source: researchoutputwizard
Source-ID: 1523
Research output: Scientific - peer-review › Conference contribution

Nonergodicity, fluctuations, and criticality in heterogeneous diffusion processes

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Biological Physics and Soft Matter, Department of Physics
Authors: Cherstvy, A., Metzler, R.
Number of pages: 12
Pages: 1-12
Publication date: 2014
Nonlinear microscopy with focused vector fields

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Research group: Nonlinear Optics, Research area: Optics, Department of Physics
Authors: Kauranen, M., Huttunen, M., Bautista, G., Mäkitalo, J.
Number of pages: 1
Publication date: 2014

Host publication information
Title of host publication: Fourth International Workshop Nanocarbon Photonics and Optoelectronics, Polvijärvi, Finland, 28.7.-1.8.2014
Editors: Svirko, Y., Obraztsov, A.

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2014-12-01
Source: researchoutputwizard
Source-ID: 694
Research output: Scientific › Conference contribution

Nonlinear multipolar light-matter interactions with gaussian vector beams

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Research group: Nonlinear Optics, Research area: Optics, Department of Physics
Authors: Huttunen, M., Mäkitalo, J., Bautista, G., Kauranen, M.
Number of pages: 1
Pages: 8-8
Publication date: 2014

Host publication information
Editor: Saarinen, J. J.

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2014-11-28
Source: researchoutputwizard
Source-ID: 517
Research output: Scientific › Conference contribution

Nonlinear optics of fiber event horizons

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Research group: Nonlinear Optics, Research area: Optics, Department of Physics, Frontier Photonics
Authors: Webb, K., Erkintalo, M., Xu, Y., Broderick, N., Dudley, J., Genty, G., Murdoch, S.
Publication date: 2014

Host publication information
Title of host publication: Conference on lasers and electro-optics , CLEO: Science and Innovations, CLEO_SI 2014, San Jose, CA, United States, 8-13 June 2014
Publisher: Optical Society of American (OSA)
Article number: FTh3D.4
ISBN (Print): 978-155752999-2

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2015-01-22<br/>Publisher name: Optical Society of American (OSA)
Source: researchoutputwizard
Source-ID: 1791
Nonlinear Optics of fibre event horizons
The nonlinear interaction of light in an optical fibre can mimic the physics at an event horizon. This analogue arises when a weak probe wave is unable to pass through an intense soliton, despite propagating at a different velocity. To date, these dynamics have been described in the time domain in terms of a soliton-induced refractive index barrier that modifies the velocity of the probe. Here we complete the physical description of fibre-optic event horizons by presenting a full frequency-domain description in terms of cascaded four-wave mixing between discrete single-frequency fields, and experimentally demonstrate signature frequency shifts using continuous wave lasers. Our description is confirmed by the remarkable agreement with experiments performed in the continuum limit, reached using ultrafast lasers. We anticipate that clarifying the description of fibre event horizons will significantly impact on the description of horizon dynamics and soliton interactions in photonics and other systems.

On the role of shot noise in carrier-envelope phase stabilization

On the role of shot noise in carrier-envelope phase stabilization

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre
Authors: Borchers, B., Anderson, A., Steinmeyer, G.
Number of pages: 13
Pages: 303-315
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Laser and Photonics Reviews
Volume: 8
Issue number: 2
ISSN (Print): 1863-8880
Ratings:
Scopus rating (2016): SJR 4.151 SNIP 3.583 CiteScore 8.71
Optically Pumped Edge-Emitting GaAs-Based Laser With Direct Orange Emission

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Toikkanen, L., Härkönen, A., Lyytikäinen, J., Leinonen, T., Laakso, A., Tukiainen, A., Viheriälä, J., Bister, M., Guina, M.
Number of pages: 3
Pages: 384-386
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: IEEE Photonics Technology Letters
Volume: 26
Issue number: 4
ISSN (Print): 1041-1135
Ratings:
Scopus rating (2016): CiteScore 2.52 SJR 1.018 SNIP 1.279
Scopus rating (2015): SJR 1.263 SNIP 1.327 CiteScore 2.62
Scopus rating (2014): SJR 1.461 SNIP 1.614 CiteScore 2.78
Scopus rating (2013): SJR 1.487 SNIP 1.547 CiteScore 2.95
Scopus rating (2012): SJR 1.623 SNIP 1.706 CiteScore 2.46
Scopus rating (2011): SJR 1.51 SNIP 2.012 CiteScore 2.48
Scopus rating (2010): SJR 1.474 SNIP 1.623
Scopus rating (2009): SJR 1.775 SNIP 1.804
Scopus rating (2008): SJR 2.081 SNIP 1.818
Scopus rating (2007): SJR 2.345 SNIP 1.566
Scopus rating (2006): SJR 2.112 SNIP 1.884
Scopus rating (2005): SJR 2.97 SNIP 2.454
Scopus rating (2004): SJR 3.286 SNIP 2.716
Scopus rating (2003): SJR 3.44 SNIP 2.467
Scopus rating (2002): SJR 3.566 SNIP 2.117
Scopus rating (2001): SJR 3.519 SNIP 1.678
Scopus rating (2000): SJR 2.345 SNIP 1.202
Scopus rating (1999): SJR 2.44 SNIP 1.302
Original language: English
DOIs:
10.1109/LPT.2013.2294726
Optical rogue waves in whispering-gallery-mode resonators

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research group: Nonlinear Optics, Research area: Optics, Department of Physics, Frontier Photonics
Authors: Coillet, A., Dudley, J., Genty, G., Larger, L., Chembo, Y.
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Physical Review A
Volume: 89
Issue number: 1
Article number: 013835
ISSN (Print): 1050-2947
Ratings:
Scopus rating (2016): CiteScore 2.25 SJR 1.281 SNIP 0.852
Scopus rating (2015): SJR 1.451 SNIP 0.903 CiteScore 2.06
Scopus rating (2014): SJR 2.121 SNIP 1.146 CiteScore 2.46
Scopus rating (2013): SJR 2.317 SNIP 1.179 CiteScore 2.86
Scopus rating (2012): SJR 2.515 SNIP 1.239 CiteScore 2.81
Scopus rating (2011): SJR 2.31 SNIP 1.261 CiteScore 2.79
Scopus rating (2010): SJR 2.403 SNIP 1.22
Scopus rating (2009): SJR 2.475 SNIP 1.305
Scopus rating (2008): SJR 2.559 SNIP 1.241
Scopus rating (2007): SJR 2.618 SNIP 1.259
Scopus rating (2006): SJR 2.342 SNIP 1.257
Scopus rating (2005): SJR 2.017 SNIP 1.286
Scopus rating (2004): SJR 2.168 SNIP 1.1
Scopus rating (2003): SJR 2.05 SNIP 1.078
Scopus rating (2002): SJR 2.037 SNIP 1.191
Scopus rating (2001): SJR 2.204 SNIP 1.521
Scopus rating (2000): SJR 2.494 SNIP 1.33
Scopus rating (1999): SJR 2.696 SNIP 1.366
Original language: English
DOIs:
10.1103/PhysRevA.89.013835

Bibliographical note
Contribution: organisation=fys,FACT1=1
Portfolio EDEND: 2014-12-17
Publisher name: American Physical Society
Source: researchoutputwizard
Source-ID: 237
Research output: Scientific - peer-review › Article

Optimal control of charge with local gates in quantum-dot lattices

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Quantum Control and Dynamics, Department of Physics, Computational Science X (CompX)
Optimal control of high-harmonic generation by intense few-cycle pulses

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Quantum Control and Dynamics, Department of Physics, Computational Science X (CompX)
Authors: Solanpää, J., Budagosky, J., Shvetsov-Shilovski, N., Castro, A., Rubio, A., Räsänen, E.
Number of pages: 5
Pages: 1-5
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Physical Review A
Volume: 90
Issue number: 5
Article number: 053402
ISSN (Print): 1050-2947
We summarize our recent results regarding the control and optimization of the second-order nonlinear response of plasmonic metamaterials. Such materials consist of arrays of metal nanoparticles, where the plasmonic resonances of individual particles depend on the size, shape, and dielectric environment of the particles. The resonances are further influenced by the coupling of the particles through the array. We first show that the second-order response, as determined by second-harmonic generation is significantly enhanced by the state-of-the-art sample quality and the resulting narrow plasmonic resonance lines. We then show that the response can depend on subtle details of the ordering of the particles in the array, with apparently similar orderings resulting in second-harmonic generation responses that differ by a factor of 50. Finally, we show that the response can be enhanced by complementing the second-harmonic active particles with passive elements that have no nonlinear response as such. Our results are important in developing metamaterials with tailorable nonlinear properties.
Polarization switching and bistability in a 1300 nm spin-VCSEL Subject to Circularly Polarized Optical Injection

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Alharti, A., Hurtado, A., Korpijärvi, V., Guina, M., Henning, I., Adams, M.
Number of pages: 2
Pages: 95-96
Publication date: 2014

Host publication information
Title of host publication: IEEE Photonics Conference, IPC 2014, 12 - 16 October, 2014, San Diego, California, USA
Publisher: IEEE
ISBN (Print): 978-1-4577-1504-4

Polarized third-harmonic generation imaging of two-photon photopolymerized microstructures

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Research group: Nonlinear Optics, Research group: Applied Optics, Research area: Optics, Department of Physics
Authors: Kunwar, P., Bautista, G., Parappurath, N., Toivonen, J., Kauranen, M.
Number of pages: 1
Pages: 62-62
Publication date: 2014

Host publication information
Editor: Saarinen, J. J.
Polymer translocation: the first two decades and the recent diversification

General information
State: Published
Ministry of Education publication type: A2 Review article in a scientific journal
Organisations: Research area: Computational Physics, Research group: Biological Physics and Soft Matter, Department of Physics
Authors: Palyulin, V. V., Ala-Nissilä, T., Metzler, R.
Pages: 9016-9037
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Soft Matter
Volume: 10
Issue number: 45
ISSN (Print): 1744-683X
Ratings:
Scopus rating (2016): SJR 1.573 SNIP 1.219 CiteScore 3.7
Scopus rating (2015): SJR 1.67 SNIP 1.33 CiteScore 3.97
Scopus rating (2014): SJR 1.751 SNIP 1.267 CiteScore 4.11
Scopus rating (2013): SJR 1.745 SNIP 1.208 CiteScore 4.2
Scopus rating (2012): SJR 1.898 SNIP 1.155 CiteScore 3.96
Scopus rating (2011): SJR 2.006 SNIP 1.314 CiteScore 4.56
Scopus rating (2010): SJR 2.165 SNIP 1.376
Scopus rating (2009): SJR 2.516 SNIP 1.534
Scopus rating (2008): SJR 2.562 SNIP 1.392
Scopus rating (2007): SJR 2.482 SNIP 1.458
Scopus rating (2006): SJR 1.899 SNIP 0.981
Original language: English
DOIs:
10.1039/c4sm01819b

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2014-12-17<br/>Publisher name: R S C Publications
Source: researchoutputwizard
Source-ID: 1226
Research output: Scientific - peer-review › Review Article

Prediction of quantum dot characteristics through universal scaling relations

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Quantum Control and Dynamics, Department of Physics, Computational Science X (CompX)
Authors: Odriazola, A., Gonzalez, A., Räsänen, E.
Number of pages: 5
Pages: 355501-1 - 355501-5
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Journal of Physics: Condensed Matter
Volume: 26
Issue number: 35
Article number: 355501
ISSN (Print): 0953-8984
Ratings:
Scopus rating (2016): CiteScore 1.89 SJR 0.881 SNIP 0.754
Proton distribution and dynamics in Y- and Zn-doped BaZrO3

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Biological Physics and Soft Matter, Research group: Materials and Molecular Modeling, Department of Physics, Computational Science X (CompX)
Authors: Kitamura, N., Akola, J., Kohara, S., Fujimoto, K., Idemoto, Y.
Number of pages: 7
Pages: 18846-18852
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Journal of Physical Chemistry C
Volume: 118
Issue number: 33
ISSN (Print): 1932-7447
Ratings:
Scopus rating (2016): CiteScore 4.48 SJR 1.948 SNIP 1.181
Scopus rating (2015): SJR 1.917 SNIP 1.268 CiteScore 4.68
Scopus rating (2014): SJR 2.027 SNIP 1.448 CiteScore 5.08
Scopus rating (2013): SJR 2.134 SNIP 1.439 CiteScore 5.14
Scopus rating (2012): SJR 2.514 SNIP 1.46 CiteScore 4.98
Scopus rating (2011): SJR 2.32 SNIP 1.457 CiteScore 4.92
Scopus rating (2010): SJR 2.438 SNIP 1.356
Scopus rating (2009): SJR 2.128 SNIP 1.417
Scopus rating (2008): SJR 1.856 SNIP 1.033
Original language: English
DOIs:
10.1088/0953-8984/26/35/355501
Links:
http://stacks.iop.org/0953-8984/26/355501

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2014-09-30<br/>Publisher name: Institute of Physics
Source: researchoutputwizard
Source-ID: 1176
Research output: Scientific - peer-review › Article
Quantum Dot Semiconductor Disk Lasers

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Optoelectronics Research Centre
Authors: Rautiainen, J., Butkus, M., Okhotnikov, O. G.
Number of pages: 26
Pages: 95-120
Publication date: 2014

Host publication information
Title of host publication: The Physics and Engineering of Compact Quantum Dot-based Lasers for Biophotonics
Publisher: Wiley-VCH Verlagsgesellschaft
Editor: Rafailov, E. U.
ISBN (Print): 978-3-527-41184-9
ISBN (Electronic): 978-3-527-66558-7
DOIs:
10.1002/9783527665587.ch3

Radioluminescence yield of alpha particles in air

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research group: Nonlinear Optics, Research area: Optics, Department of Physics, Frontier Photonics
Authors: Sand, J., Ihantola, S., Peräjärvi, K., Toivonen, H., Toivonen, J.
Number of pages: 13
Pages: 1-13
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: New Journal of Physics
Volume: 16
Article number: 053022
ISSN (Print): 1367-2630
Ratings:
Scopus rating (2016): CiteScore 2.97 SJR 1.788 SNIP 1.031
Scopus rating (2015): SJR 1.938 SNIP 1.047 CiteScore 2.8
Scopus rating (2014): SJR 2.806 SNIP 1.307 CiteScore 2.89
Scopus rating (2013): SJR 2.871 SNIP 1.372 CiteScore 2.77
Scopus rating (2012): SJR 3.352 SNIP 1.533 CiteScore 3.4
Scopus rating (2011): SJR 3.47 SNIP 1.634 CiteScore 3.99
Scopus rating (2010): SJR 3.395 SNIP 1.421
Scopus rating (2009): SJR 3.215 SNIP 1.503
Scopus rating (2008): SJR 2.913 SNIP 1.396
Refined OPLS All-Atom Force Field for Saturated Phosphatidylcholine Bilayers at Full Hydration

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Biological Physics and Soft Matter, Department of Physics, Computational Science X (CompX), Multi-scaled biodata analysis and modelling (MultiBAM)
Authors: Maciejewski, A., Pasenkiewicz-Gierula, M., Cramariuc, O., Vattulainen, I., Rog, T.
Number of pages: 11
Pages: 4571-4581
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Journal of Physical Chemistry C
Volume: 118
Issue number: 17
ISSN (Print): 1932-7447
Ratings:
Scopus rating (2016): CiteScore 4.48 SJR 1.948 SNIP 1.181
Scopus rating (2015): SJR 1.917 SNIP 1.268 CiteScore 4.68
Scopus rating (2014): SJR 2.027 SNIP 1.448 CiteScore 5.08
Scopus rating (2013): SJR 2.134 SNIP 1.439 CiteScore 5.14
Scopus rating (2012): SJR 2.514 SNIP 1.46 CiteScore 4.98
Scopus rating (2011): SJR 2.32 SNIP 1.457 CiteScore 4.92
Scopus rating (2010): SJR 2.438 SNIP 1.356
Scopus rating (2009): SJR 2.128 SNIP 1.417
Scopus rating (2008): SJR 1.856 SNIP 1.033
Original language: English
DOI: 10.1021/jp5016627

Bibliographical note
Contribution: organisation=fys,FACT1=1<br>Portfolio EDEND: 2014-09-30<br>Publisher name: American Chemical Society
Source: researchoutputwizard
Source-ID: 983
Research output: Scientific - peer-review › Article
Resonant radiation from collapsing light pulses and spatiotemporal light bullets

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Research group: Nonlinear Optics, Research area: Optics, Department of Physics, Frontier Photonics
Authors: Faccio, D., Roger, T., Petev, M., Clerici, M., Morandotti, R., Legare, F., Majus, D., Tamosauskas, G., Dubietis, A., Couairon, A., Genty, G., Panagiotopoulos, P., Kolesik, M.
Publication date: 2014

Host publication information
Title of host publication: Laser Science, LS 2014, Tucson, United States, 19-23 October 2014
ISBN (Print): 1557522863

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2015-01-22
Source: researchoutputwizard
Source-ID: 289
Research output: Scientific - peer-review › Conference contribution

Rogue wave structures in spontaneous modulation instability

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Research group: Nonlinear Optics, Research area: Optics, Department of Physics, Frontier Photonics
Authors: Toenger, S., Genty, G., Dias, F., Erkintalo, M., Dudley, J.
Publication date: 2014

Host publication information
Title of host publication: Nonlinear Photonics, NP 2014
Publisher: Optical Society of America (OSA)
Article number: NM3A.3
ISBN (Print): 978-155752820-9

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2015-01-22<br/>Publisher name: Optical Society of America (OSA)
Source: researchoutputwizard
Source-ID: 1633
Research output: Scientific - peer-review › Conference contribution

Scaled Brownian motion: a paradoxical process with a time dependent diffusivity for the description of anomalous diffusion

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Biological Physics and Soft Matter, Department of Physics
Authors: Jeon, J., Chechkin, A. V., Metzler, R.
Number of pages: 7
Pages: 15811-15817
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Physical Chemistry Chemical Physics
Volume: 16
Issue number: 30
ISSN (Print): 1463-9076
Ratings:
Scopus rating (2016): CiteScore 4.06 SJR 1.678 SNIP 1.117
Scopus rating (2015): SJR 1.771 SNIP 1.244 CiteScore 4.45
Scopus rating (2014): SJR 1.772 SNIP 1.253 CiteScore 4.29
Scaling in the correlation energies of atomic ions

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Quantum Control and Dynamics, Department of Physics, Computational Science X (CompX)
Authors: Odriazola, A., Gonzalez, A., Räsänen, E.
Number of pages: 4
Pages: 1-4
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Physical Review A
Volume: 90
Issue number: 5
Article number: 052510
ISSN (Print): 1050-2947
Ratings:
Scopus rating (2016): CiteScore 2.25 SJR 1.281 SNIP 0.852
Scopus rating (2015): SJR 1.451 SNIP 0.903 CiteScore 2.06
Scopus rating (2014): SJR 2.121 SNIP 1.146 CiteScore 2.46
Scopus rating (2013): SJR 2.317 SNIP 1.179 CiteScore 2.86
Scopus rating (2012): SJR 2.515 SNIP 1.239 CiteScore 2.81
Scopus rating (2011): SJR 2.31 SNIP 1.261 CiteScore 2.79
Scopus rating (2010): SJR 2.403 SNIP 1.22
Scopus rating (2009): SJR 2.475 SNIP 1.305
Scopus rating (2008): SJR 2.559 SNIP 1.241
Scopus rating (2007): SJR 2.618 SNIP 1.259
Scopus rating (2006): SJR 2.342 SNIP 1.257
Scopus rating (2005): SJR 2.017 SNIP 1.286
Scopus rating (2004): SJR 2.168 SNIP 1.1
Second-harmonic generation microscopy of vertically aligned semiconductor nanowires

We perform a detailed characterisation of the second-order nonlinear optical response of nanocomposites consisting of alternating layers of silver-decorated silica glass nanoparticles and pure silica glass. The samples are fabricated using aerosol techniques and electron-beam dielectric coating, resulting in a bulk-like material with symmetry-breaking induced by the porosity of the alternating layers. The second-order nonlinear response increases with the number of layers. Further, by determining the components of the second-order susceptibility tensor of the samples, we show that the structural properties of the samples are well maintained as the sample thickness is increased. Our results form an important baseline for any further optimization of these types of structures, which can be fabricated using very straightforward methods.

Second-harmonic response of multilayer nanocomposites of silver-decorated nanoparticles and silica

We perform a detailed characterisation of the second-order nonlinear optical response of nanocomposites consisting of alternating layers of silver-decorated silica glass nanoparticles and pure silica glass. The samples are fabricated using aerosol techniques and electron-beam dielectric coating, resulting in a bulk-like material with symmetry-breaking induced by the porosity of the alternating layers. The second-order nonlinear response increases with the number of layers. Further, by determining the components of the second-order susceptibility tensor of the samples, we show that the structural properties of the samples are well maintained as the sample thickness is increased. Our results form an important baseline for any further optimization of these types of structures, which can be fabricated using very straightforward methods.
Semiconductor disk laser with a semiconductor dielectric-metal mirror

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Research group: Ultrafast and intense lasers, Research group: Surface Science, Frontier Photonics
Authors: Rantamäki, A., Saarinen, E. J., Lyytikäinen, J., Lahtonen, K., Valden, M., Okhotnikov, O. G.
Number of pages: 1
Pages: 1-1
Publication date: 2014

Host publication information
Title of host publication: 16th International Conference on Laser Optics 2014, June 30 - July 4, 2014, St. Petersburg, Russia
Publisher: IEEE
ISBN (Print): 978-1-4799-3884-1
ISBN (Electronic): 978-1-4799-3885-8

Publication series
Name: International Conference on Laser Optics
DOIs: 10.1109/LO.2014.6886292

Bibliographical note
Talk TuR3-16<br>Contribution: organisation=orc,FACT1=1<br>Portfolio EDEND: 2014-09-30<br>Publisher name: IEEE
Source: researchoutputwizard
Source-ID: 1350
Research output: Scientific - peer-review › Conference contribution

SESAM Mode-Locked Red Praseodymium Laser

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Gaponenko, M., Metz, P., Härkönen, A., Heuer, A., Leinonen, T., Guina, M., Südmeyer, T., Huber, G., Kränkel, C.
Number of pages: 3
Pages: 6939-6941
Single Lipid Extraction: The Anchoring Strength of Cholesterol in Liquid-Ordered and Liquid-Disordered Phases

General information
State: Published
Ministry of Education publication type: A1 Journal article refereed
Organisations: Research area: Computational Physics, Research group: Biological Physics and Soft Matter, Department of Physics, Computational Science X (CompX)
Authors: Stetter, F., Cwiklic, L., Jungwirth, P., Hugel, T.
Number of pages: 9
Pages: 1167-1175
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Biophysical Journal
Volume: 107
Issue number: 5
ISSN (Print): 0006-3495
Ratings:
Scopus rating (2016): SJR 1.946 SNIP 1.018 CiteScore 3.06
Scopus rating (2015): SJR 2.145 SNIP 1.173 CiteScore 3.3
Scopus rating (2014): SJR 2.203 SNIP 1.166 CiteScore 3.33
Spatiotemporal light bullets in bulk media

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Research group: Nonlinear Optics, Research area: Optics, Department of Physics, Frontier Photonics
Authors: Faccio, D., Roger, T., Petev, M., Clerici, M., Morandotti, R., Legare, F., Majus, D., Tamosauskas, G., Dubietis, A., Couairon, A., Genty, G., Panagiotopoulos, P., Kolesik, M.
Publication date: 2014

Host publication information
Title of host publication: Nonlinear Photonics, NP 2014
Publisher: Optical Society of America (OSA)
Article number: NM3A.1
ISBN (Print): 978-155752820-9

Bibliographical note
Contribution: organisation=fys,FACT1=1
Portfolio EDEND: 2014-12-18
Publisher name: Biophysical Society
Source: researchoutputwizard
Source-ID: 1548
Research output: Scientific - peer-review › Article

Stable and efficient momentum-space solutions of the time-dependent Schrödinger equation for one-dimensional atoms in strong laser fields

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Quantum Control and Dynamics, Department of Physics, Computational Science X (CompX)
Authors: Shvetsov-Shilovski, N. I., Räsänen, E.
Number of pages: 8
Pages: 174-181
Publication date: 2014
Peer-reviewed: Yes
Structure and dynamics in liquid bismuth and Bi clusters: A density functional study

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Biological Physics and Soft Matter, Research group: Materials and Molecular Modeling, Department of Physics, Computational Science X (CompX)
Authors: Akola, J., Atodiresei, N., Kalikka, J., Larrucea, J., Jones, O.
Number of pages: 10
Pages: 1-10
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Journal of Chemical Physics
Volume: 141
Issue number: 19
Article number: 194503
ISSN (Print): 0021-9445
ISSN (Online): 1089-7690
Ratings:
Scopus rating (2016): CiteScore 2.13 SJR 1.073 SNIP 0.755
Scopus rating (2015): SJR 0.953 SNIP 0.767 CiteScore 1.98
Scopus rating (2014): SJR 1.386 SNIP 0.989 CiteScore 2.54
Scopus rating (2013): SJR 1.532 SNIP 1.17 CiteScore 2.95
Structure, electronic, and vibrational properties of amorphous AsS2 and AgAsS2: Experimentally constrained density functional study

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Biological Physics and Soft Matter, Research group: Materials and Molecular Modeling, Department of Physics, Computational Science X (CompX)
Authors: Akola, J., Jovari, P., Kaban, I., Voleska, I., Kolar, J., Wagner, T., Jones, O.
Number of pages: 9
Pages: 1-9
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Physical Review B
Volume: 89
Issue number: 6
Article number: 064202
ISSN (Print): 1098-0121
Ratings:
Scopus rating (2016): CiteScore 3.16 SJR 1.939 SNIP 1
Scopus rating (2015): SJR 1.943 SNIP 1.008 CiteScore 2.8
Scopus rating (2014): SJR 2.656 SNIP 1.302 CiteScore 3.3
Scopus rating (2013): SJR 2.804 SNIP 1.348 CiteScore 3.55
Scopus rating (2012): SJR 3.159 SNIP 1.397 CiteScore 3.57
Scopus rating (2011): SJR 3.306 SNIP 1.433 CiteScore 3.61
Scopus rating (2010): SJR 3.303 SNIP 1.45
Scopus rating (2009): SJR 3.116 SNIP 1.467
Scopus rating (2008): SJR 2.949 SNIP 1.525
Scopus rating (2007): SJR 2.925 SNIP 1.609
Scopus rating (2006): SJR 2.799 SNIP 1.56
Scopus rating (2005): SJR 2.748 SNIP 1.587
Scopus rating (2004): SJR 2.718 SNIP 1.583
Supercontinuum and solitons, what's up?

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Research group: Nonlinear Optics, Research area: Optics, Department of Physics, Frontier Photonics
Authors: Genty, G., Dudley, J.
Publication date: 2014

Host publication information
Title of host publication: Conference on lasers and electro-optics , CLEO: Science and Innovations, CLEO_SI 2014, San Jose, CA, United States, 8-13 June 2014
Publisher: Optical Society of American (OSA)
Article number: SW1I.1
ISBN (Print): 978-155752999-2
DOIs:
10.1364/CLEO_SI.2014.SW1I.1

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2015-01-22<br/>Publisher name: Optical Society of American (OSA)
Source-ID: 335
Research output: Scientific - peer-review › Conference contribution

Surface Modifications and Analysis Methods at Molecular Level

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Research group: Surface Science, Department of Physics, Research group: Ultrafast and intense lasers, Research group: Nanophotonics
Publication date: 2014

Host publication information
Title of host publication: Abstracts of the 28th International Conference on Surface Modification Technologies, SMT28, Tampere University of Technology, Tampere, Finland, June 16-18, 2014
Place of publication: Tampere
Publisher: Tampere University of Technology
Links:

Bibliographical note
xabstract
The challenges of understanding glycolipid functions: An open outlook based on molecular simulations

General information
State: Published
Ministry of Education publication type: A2 Review article in a scientific journal
Organisations: Research area: Computational Physics, Research group: Biological Physics and Soft Matter, Department of Physics, Computational Science X (CompX)
Authors: Manna, M., Rog, T., Vattulainen, I.
Number of pages: 16
Pages: 1130-1145
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Biochimica et Biophysica Acta: Molecular and Cell Biology of Lipids
Volume: 1841
Issue number: 8
ISSN (Print): 1388-1981
Ratings:
Scopus rating (2016): SJR 2.59 SNIP 1.445 CiteScore 5.28
Scopus rating (2015): SJR 2.53 SNIP 1.316 CiteScore 4.77
Scopus rating (2014): SJR 2.408 SNIP 1.282 CiteScore 4.6
Scopus rating (2013): SJR 2.181 SNIP 1.313 CiteScore 4.88
Scopus rating (2012): SJR 2.17 SNIP 1.297 CiteScore 4.89
Scopus rating (2011): SJR 2.51 SNIP 1.315 CiteScore 5.2
Scopus rating (2010): SJR 2.471 SNIP 1.338
Scopus rating (2009): SJR 2.506 SNIP 1.25
Scopus rating (2008): SJR 2.487 SNIP 1.03
Scopus rating (2007): SJR 2.03 SNIP 0.906
Scopus rating (2006): SJR 1.475 SNIP 0.91
Scopus rating (2005): SJR 2.102 SNIP 1.086
Scopus rating (2004): SJR 2.18 SNIP 1.068
Scopus rating (2003): SJR 2.418 SNIP 1.376
Scopus rating (2002): SJR 2.248 SNIP 1.265
Scopus rating (2001): SJR 2.268 SNIP 0.99
Scopus rating (2000): SJR 1.924 SNIP 1.024
Scopus rating (1999): SJR 1.794 SNIP 1.077
Original language: English

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2014-05-20<br/>Publisher name: Elsevier BV
Source: researchoutputwizard
Source-ID: 1021
Research output: Scientific - peer-review › Review Article

Theoretical Studies on Multiphoton Absorption of Ultrashort Laser Pulses in Sapphire

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre
Authors: Arola, E.
Number of pages: 12
Pages: 709-720
Publication date: 2014
Peer-reviewed: Yes
Time-dependent density-functional theory of strong-field ionization of atoms by soft x rays

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Quantum Control and Dynamics, Department of Physics, Computational Science X (CompX)
Number of pages: 8
Pages: 033412-1 - 033412-8
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Physical Review A
Volume: 90
Article number: 033412
ISSN (Print): 1050-2947
Ratings:
Scopus rating (2016): CiteScore 2.25 SJR 1.281 SNIP 0.852
Scopus rating (2015): SJR 1.451 SNIP 0.903 CiteScore 2.06
Scopus rating (2014): SJR 2.121 SNIP 1.146 CiteScore 2.46
Scopus rating (2013): SJR 2.317 SNIP 1.179 CiteScore 2.86
Scopus rating (2012): SJR 2.515 SNIP 1.239 CiteScore 2.81
Towards THz-Class Pulse Train Semiconductor Disk Laser

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Okhotnikov, O. G., Saarinen, E. J.
Number of pages: 1
Pages: 1-1
Publication date: 2014

Host publication information
Title of host publication: 16th International Conference on Laser Optics 2014, June 30 - July 4, 2014, St. Petersburg, Russia
Publisher: IEEE
ISBN (Print): 978-1-4799-3884-1
ISBN (Electronic): 978-1-4799-3885-8

Publication series
Name: International Conference on Laser Optics
DOIs:
10.1109/LO.2014.6886294

Bibliographical note
Invited Talk TUR3-19
Contribution: organisation=orc,FACT1=1
Portfolio EDEND: 2014-09-30
Publisher name: IEEE
Source: researchoutputwizard
Source-ID: 1188
Research output: Scientific - peer-review » Conference contribution

Ultrahigh precision nonlinear reflectivity measurement system for saturable absorber mirrors with self-referenced fluence characterization

General information
State: Published
Universal Method for Embedding Proteins into Complex Lipid Bilayers for Molecular Dynamics Simulations

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Biological Physics and Soft Matter, Department of Physics
Authors: Javanainen, M.
Number of pages: 6
Pages: 2577-2582
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Journal of Chemical Theory and Computation
Volume: 10
Issue number: 6
ISSN (Print): 1549-9618
Vector-field nonlinear microscopy of nano-objects

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Research group: Nonlinear Optics, Research area: Optics, Department of Physics
Authors: Kauranen, M., Huttunen, M., Mäkitalo, J., Bautista, G.
Pages: 1-2
Publication date: 2014

Host publication information
Title of host publication: 23rd Congress of the International Commission for Optics: Enlightening the future, 26th-29th August, 2014, Santiago de Compostela, Spain
ISBN (Print): 978-84-697-1027-2
Links:
http://ico23.org/site/web/varios/program.php
http://ico23.org/site/web/ico23_program.pdf

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2014-09-30<br/>Publisher name: American Chemical Society
Source: researchoutputwizard
Source-ID: 593
Research output: Scientific - peer-review › Article

Wafer-fused VECSELs emitting in the 1310nm waveband

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Frontier Photonics
Number of pages: 8
Pages: 1-8
Publication date: 2014

Host publication information
Title of host publication: Photonics West 2014, Vertical External Cavity Surface Emitting Lasers (VECSELs) IV, February 1-6, 2014, San Fransisco, CA, USA. Proceedings of SPIE
Wafer fused, wavelength controlled 1300 nm vertical external cavity surface emitting lasers

**General information**
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Research group: Ultrafast and intense lasers, École Polytechnique Fédérale de Lausanne, Laboratory of Physics of Nanostructures, CH-1015 Lausanne, Switzerland
Publication date: 2014

**Host publication information**
Title of host publication: 17th International Conference on Metalorganic Vapor Phase Epitaxy

**Bibliographical note**
Invited Paper<br/>Portfolio EDEND: 2014-04-29<br/>Publisher name: SPIE - International Society for Optical Engineering
Source: researchoutputwizard
Source-ID: 1518
Research output: Scientific - peer-review › Conference contribution

1.32 μm mode-locked bismuth-doped fiber laser operating in anomalous and normal dispersion regimes
We demonstrate a 1.32 μm mode-locked bismuth fiber laser operating in both anomalous and normal dispersion regimes. In anomalous dispersion regime, achieved by using 13 nm/cm linearly chirped fiber Bragg grating, the laser exhibits multiple soliton operation with pulse duration of 2.51 ps. With the net normal cavity dispersion, the single-pulse operation with higher power has been obtained by avoiding the limitations generic to conservative soliton systems. (C) 2013 Optical Society of America

**General information**
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research group: Ultrafast and intense lasers, Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Frontier Photonics, Russian Acad Sci, Russian Academy of Sciences, Fiber Opt Res Ctr
Authors: Gumenyuk, R., Puustinen, J., Shubin, A. V., Bufetov, I. A., Dianov, E. M., Okhotnikov, O. G.
Number of pages: 3
Pages: 4005-4007
Publication date: 15 Oct 2013
Peer-reviewed: Yes

**Publication information**
Journal: Optics Letters
Volume: 38
Issue number: 20
ISSN (Print): 0146-9592
Ratings:
Scopus rating (2016): CiteScore 3.54 SJR 1.864 SNIP 1.658
Scopus rating (2015): SJR 2.142 SNIP 1.642 CiteScore 3.53
Scopus rating (2014): SJR 2.497 SNIP 2.056 CiteScore 3.86
Scopus rating (2013): SJR 2.458 SNIP 2.095 CiteScore 3.95
Polarization control of the bound state of a vector soliton

This article demonstrates that the number of pulses in a group of vector bound solitons can be accurately adjusted by polarization control. We could achieve states with up to seven pulses trapped in a group with equally firm pulse separation. The stable relative phase between pulses within the group is manifested as an interference pattern in the soliton spectrum. © 2013 Astro Ltd.
1.56 \mu m 1\text{ watt single frequency semiconductor disk laser}

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Rantamäki, A., Rautiainen, J., Sirbu, A., Mereuta, A., Kapon, E., Okhotnikov, O. G.
Number of pages: 6
Pages: 2355-2360
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Optics Express
Volume: 21
Issue number: 2
ISSN (Print): 1094-4087

Ratings:
Scopus rating (2016): CiteScore 3.48 SJR 1.487 SNIP 1.589
Scopus rating (2015): SJR 1.976 SNIP 1.755 CiteScore 3.78
Scopus rating (2014): SJR 2.349 SNIP 2.166 CiteScore 4.18
Scopus rating (2013): SJR 2.358 SNIP 2.226 CiteScore 4.38
Scopus rating (2012): SJR 2.587 SNIP 2.145 CiteScore 3.85
Scopus rating (2011): SJR 2.579 SNIP 2.606 CiteScore 4.04
Scopus rating (2010): SJR 2.943 SNIP 2.466
Scopus rating (2009): SJR 3.092 SNIP 2.669
Scopus rating (2008): SJR 3.195 SNIP 2.393
Scopus rating (2007): SJR 3.27 SNIP 2.032
Scopus rating (2006): SJR 3.233 SNIP 2.326
Scopus rating (2005): SJR 3.334 SNIP 2.379
Scopus rating (2004): SJR 2.833 SNIP 2.499
Scopus rating (2003): SJR 2.688 SNIP 2.193
Scopus rating (2002): SJR 1.547 SNIP 1.673
Scopus rating (2001): SJR 1.442 SNIP 1.39
Scopus rating (2000): SJR 1.246 SNIP 0.714
Scopus rating (1999): SJR 1.381 SNIP 0.838

Original language: English
DOIs:
10.1088/1612-2011/10/5/055111

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2013-07-29<br/>Publisher name: Institute of Physics Publishing
Source: researchoutputwizard
Source-ID: 2201
Research output: Scientific - peer-review › Article

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2013-05-29<br/>Publisher name: Optical Society of America - OSA
160W single-frequency laser based on active tapered double-clad fiber amplifier

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre
Authors: Trikshev, A., Kurkov, A., Tsvetkov, V., Filatova, S., Kerttula, J., Filippov, V., Chamorovskiy, Y., Okhotnikov, O.
Number of pages: 1
Pages: 1-1
Publication date: 2013

Host publication information
Title of host publication: International Conference on Coherent and Nonlinear Optics, International Conference on Lasers, Applications, and Technologies, ICONO/LAT 2013, June 18 - 20, 2013, Moscow, Russia
Place of publication: Moscow, Russia
Publisher: International Laser Center, Moscow State University

Publication series
Name: International Conference on Coherent and Nonlinear Optics, International Conference on Lasers, Applications, and Technologies
Links:

Bibliographical note
Oral presentation LWJ6<br/>Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2013-11-29<br/>Publisher name: International Laser Center, Moscow State University
Source: researchoutputwizard
Source-ID: 3557
Research output: Scientific - peer-review › Conference contribution

160W single-frequency laser based on active tapered double-clad fiber amplifier

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Trikshev, A., Kurkov, A., Tsvetkov, V., Filatova, S., Kerttula, J., Filippov, V., Chamorovskiy, Y., Okhotnikov, O. G.
Number of pages: 1
Pages: 1-1
Publication date: 2013

Host publication information
Title of host publication: 2013 Conference on Lasers and Electro-Optics Europe and International Quantum Electronics Conference, CLEO/EUROPE - IQEC 2013, 12-16 May 2013, Munich, Germany
Place of publication: Piscataway, NJ
Publisher: IEEE

Publication series
Name: European Conference on Lasers and Electro-Optics and the International Quantum Electronics Conference

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2013-09-29<br/>Publisher name: IEEE
Source: researchoutputwizard
Source-ID: 3559
Research output: Scientific - peer-review › Conference contribution

1 Watt from 1.56 µm Single Frequency Semiconductor Disk Laser

General information
2-μm Tm:Lu2O3 ceramic disk laser intracavity-pumped by a semiconductor disk laser
A 160 W single-frequency laser based on an active tapered double-clad fiber amplifier

Actively Mode-Locked Semiconductor Disk Laser Using Vertical Cavity Modulator
Amplification of chirped pulses in inhomogeneous three-level active optical fibers

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre
Authors: Zolotovskii, I., Korobko, D., Okhotnikov, O., Sementsov, D., Sysoliatin, A., Fotiadi, A.
Number of pages: 6
Pages: 260-265
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Optics and Spectroscopy
Volume: 114
Issue number: 2
ISSN (Print): 0030-400X
Ratings:
Scopus rating (2016): SJR 0.331 SNIP 0.659 CiteScore 0.66
Scopus rating (2015): SJR 0.274 SNIP 0.587 CiteScore 0.55
Scopus rating (2014): SJR 0.297 SNIP 0.585 CiteScore 0.55
Scopus rating (2013): SJR 0.288 SNIP 0.608 CiteScore 0.53
Scopus rating (2012): SJR 0.413 SNIP 0.582 CiteScore 0.48
Scopus rating (2011): SJR 0.251 SNIP 0.522 CiteScore 0.38
Scopus rating (2010): SJR 0.249 SNIP 0.457
Scopus rating (2009): SJR 0.215 SNIP 0.326
Scopus rating (2008): SJR 0.204 SNIP 0.188
Scopus rating (2007): SJR 0.2 SNIP 0.234
Scopus rating (2006): SJR 0.284 SNIP 0.548
Scopus rating (2005): SJR 0.244 SNIP 0.507
Scopus rating (2004): SJR 0.337 SNIP 0.629
Scopus rating (2003): SJR 0.217 SNIP 0.384
Scopus rating (2002): SJR 0.216 SNIP 0.557
Scopus rating (2001): SJR 0.222 SNIP 0.457
Scopus rating (2000): SJR 0.195 SNIP 0.322
Scopus rating (1999): SJR 0.195 SNIP 0.205
Original language: English
DOIs:
10.1134/S0030400X1301030X

Bibliographical note
English translation of Optika i Spektroskopiya

Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2013-12-29<br/>Publisher name: MAIK Nauka - Interperiodica
Source: researchoutputwizard
Source-ID: 3789
Research output: Scientific - peer-review › Article
Compression and Generation of Optical Pulses in Anomalous Dispersion Decreasing Fibers

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre
Authors: Korobko, D., Okhotnikov, O., Sysolyatin, A., Yavtushenko, M.
Number of pages: 2
Pages: 1-2
Publication date: 2013

Host publication information
Title of host publication: International Conference on Coherent and Nonlinear Optics, International Conference on Lasers, Applications, and Technologies, ICONO/LAT 2013, June 18 - 20, 2013, Moscow, Russia
Place of publication: Moscow, Russia
Publisher: International Laser Center, Moscow State University

Publication series
Name: International Conference on Coherent and Nonlinear Optics, International Conference on Lasers, Applications, and Technologies

Bibliographical note
Oral presentation LThC6<br/>Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2013-11-29<br/>Publisher name: International Laser Center, Moscow State University
Source: researchoutputwizard
Source-ID: 2608
Research output: Scientific - peer-review › Conference contribution

Control of the absorption recovery time in GaSb SESAMs

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Paajaste, J., Suomalainen, S., Härkönen, A., Griebner, G., Steinmeyer, G., Guina, M.
Number of pages: 1
Pages: 1-1
Publication date: 2013

Host publication information
Title of host publication: 2013 Conference on Lasers and Electro-Optics Europe and International Quantum Electronics Conference, CLEO/EUROPE - QI EC 2013, 12-16 May 2013, Munich, Germany
Place of publication: Piscataway, NJ
Publisher: IEEE

Publication series
High power semiconductor disk lasers for 1.3-1.6 µm and 650-800 nm spectral ranges

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Research group: Ultrafast and intense lasers, École Polytechnique Fédérale de Lausanne, Laboratory of Physics of Nanostructures, CH-1015 Lausanne, Switzerland
Authors: Rantamäki, A., Rautiainen, J. T., Lyytikäinen, J., Heikkinen, J. J., Sirbu, A., Mereuta, A., Kapon, E., Okhotnikov, O.
Publication date: 2013

Host publication information
Title of host publication: 2nd European Workshop on VeCSELs, 15 - 17 October, 2013, Montpellier, France
Research output: Scientific - peer-review » Conference contribution

High-repetition-rate pulse generation and compression in dispersion decreasing fibers

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre
Authors: Korobko, D. A., Okhotnikov, O. G., Zolotovskii, I. O.
Number of pages: 10
Pages: 2377-2386
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Journal of the Optical Society of America B
Volume: 30
Issue number: 9
ISSN (Print): 0740-3224
Ratings:
Scopus rating (2016): CiteScore 1.81 SJR 0.894 SNIP 1.015
Scopus rating (2015): SJR 1.023 SNIP 1.002 CiteScore 1.78
Scopus rating (2014): SJR 1.188 SNIP 1.156 CiteScore 2.09
Scopus rating (2013): SJR 1.354 SNIP 1.281 CiteScore 2.33
Scopus rating (2012): SJR 1.517 SNIP 1.273 CiteScore 2.2
Scopus rating (2011): SJR 1.527 SNIP 1.495 CiteScore 2.33
Scopus rating (2010): SJR 1.47 SNIP 1.356
Scopus rating (2009): SJR 1.763 SNIP 1.59
Scopus rating (2008): SJR 1.645 SNIP 1.33
Scopus rating (2007): SJR 1.737 SNIP 1.29
Scopus rating (2006): SJR 1.644 SNIP 1.411
Scopus rating (2005): SJR 2.071 SNIP 1.686
Scopus rating (2004): SJR 1.974 SNIP 1.626
Scopus rating (2003): SJR 1.742 SNIP 1.414
Scopus rating (2002): SJR 1.754 SNIP 1.406
Scopus rating (2001): SJR 1.809 SNIP 1.394
Scopus rating (2000): SJR 1.778 SNIP 1.131
Scopus rating (1999): SJR 1.976 SNIP 1.161
Original language: English
DOIs:
Impact of Gain Medium Dispersion on Stability of Soliton Bound States in Fiber Laser

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Gumenyuk, R., Okhotnikov, O. G.
Number of pages: 3
Pages: 133-135
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: IEEE Photonics Technology Letters
Volume: 25
Issue number: 2
ISSN (Print): 1041-1135
Ratings:
Scopus rating (2016): CiteScore 2.52 SJR 1.018 SNIP 1.279
Scopus rating (2015): SJR 1.263 SNIP 1.327 CiteScore 2.62
Scopus rating (2014): SJR 1.461 SNIP 1.614 CiteScore 2.78
Scopus rating (2013): SJR 1.487 SNIP 1.547 CiteScore 2.95
Scopus rating (2012): SJR 1.623 SNIP 1.706 CiteScore 2.46
Scopus rating (2011): SJR 1.51 SNIP 2.012 CiteScore 2.48
Scopus rating (2010): SJR 1.474 SNIP 1.623
Scopus rating (2009): SJR 1.775 SNIP 1.804
Scopus rating (2008): SJR 2.081 SNIP 1.818
Scopus rating (2007): SJR 2.345 SNIP 1.566
Scopus rating (2006): SJR 2.112 SNIP 1.884
Scopus rating (2005): SJR 2.97 SNIP 2.454
Scopus rating (2004): SJR 3.286 SNIP 2.716
Scopus rating (2003): SJR 3.44 SNIP 2.467
Scopus rating (2002): SJR 3.566 SNIP 2.117
Scopus rating (2001): SJR 3.519 SNIP 1.678
Scopus rating (2000): SJR 2.345 SNIP 1.202
Scopus rating (1999): SJR 2.44 SNIP 1.302
Original language: English
DOI:
10.1109/LPT.2012.2229699

Incoherent resonant seeding of modulation instability in optical fiber

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
InGaAs/GaAs Multiple-Quantum-Well Semiconductor Disk Laser Pumped With Electron Beam

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre
Authors: Kozlovsky, V. I., Okhotnikov, O. G., Popov, Y. M.
Number of pages: 6
Pages: 108-113
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: IEEE journal of quantum electronics
Volume: 49
Issue number: 1
ISSN (Print): 0018-9197
Ratings:
In Situ XPS Studies of Electrochemically Negatively Polarized Molybdenum Carbide Derived Carbon Double Layer Capacitor Electrode

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Surface Science, Frontier Photonics
Authors: Tonisoo, A., Kruusma, J., Pärna, R., Kikas, A., Hirsimäki, M., Nommiste, E., Lust, E.
Number of pages: 10
Pages: A1084-A1093
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Journal of the Electrochemical Society
Volume: 160
Issue number: 8
ISSN (Print): 0013-4651
Ratings:
Scopus rating (2016): SJR 1.134 SNIP 0.867 CiteScore 2.97
Scopus rating (2015): SJR 1.037 SNIP 1 CiteScore 3.17
Scopus rating (2014): SJR 1.147 SNIP 1.206 CiteScore 3.36
Scopus rating (2013): SJR 1.151 SNIP 1.299 CiteScore 2.92
Scopus rating (2012): SJR 1.329 SNIP 1.296 CiteScore 2.61
Scopus rating (2011): SJR 1.33 SNIP 1.345 CiteScore 2.74
Scopus rating (2010): SJR 1.417 SNIP 1.312
Scopus rating (2009): SJR 1.45 SNIP 1.267
Scopus rating (2008): SJR 1.608 SNIP 1.416
Scopus rating (2007): SJR 1.58 SNIP 1.325
Scopus rating (2006): SJR 1.611 SNIP 1.54
Scopus rating (2005): SJR 1.519 SNIP 1.484
Scopus rating (2004): SJR 1.719 SNIP 1.706
Scopus rating (2003): SJR 1.962 SNIP 1.679
Scopus rating (2002): SJR 2.147 SNIP 1.646
Scopus rating (2001): SJR 1.651 SNIP 1.738
Scopus rating (2000): SJR 1.788 SNIP 1.708
Scopus rating (1999): SJR 1.657 SNIP 1.85
Original language: English
DOIs: 10.1149/2.042308jes

**Bibliographical note**
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2013-09-29<br/>Publisher name: Electrochemical Society
Source: researchoutputwizard
Source-ID: 3553
Research output: Scientific - peer-review › Article

Intracavity laser spectroscopy with a semiconductor disk laser-pumped cw Cr2+: ZnSe laser

**General information**
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre
Authors: Kozlovsky, V., Korostelin, Y., Okhotnikov, O., Podmarkov, Y., Skasyrsky, Y., Frolov, M., Akimov, V.
Number of pages: 5
Pages: 885-889
Publication date: 2013
Peer-reviewed: Yes

**Publication information**
Journal: Quantum Electronics
Volume: 43
Issue number: 9
ISSN (Print): 1063-7818
Ratings:
- Scopus rating (2016): SJR 0.491 SNIP 1.101 CiteScore 1.13
- Scopus rating (2015): SJR 0.582 SNIP 1.193 CiteScore 1.07
- Scopus rating (2014): SJR 0.531 SNIP 0.927 CiteScore 0.89
- Scopus rating (2013): SJR 0.555 SNIP 1.062 CiteScore 0.94
- Scopus rating (2012): SJR 0.433 SNIP 0.822 CiteScore 0.69
- Scopus rating (2011): SJR 0.438 SNIP 0.911 CiteScore 0.7
- Scopus rating (2010): SJR 0.415 SNIP 0.852
- Scopus rating (2009): SJR 0.444 SNIP 1.039
- Scopus rating (2008): SJR 0.459 SNIP 0.877
- Scopus rating (2007): SJR 0.391 SNIP 0.776
- Scopus rating (2006): SJR 0.286 SNIP 0.747
- Scopus rating (2005): SJR 0.302 SNIP 0.719
- Scopus rating (2004): SJR 0.272 SNIP 0.803
- Scopus rating (2003): SJR 0.318 SNIP 0.547
- Scopus rating (2002): SJR 0.253 SNIP 0.766
- Scopus rating (2001): SJR 0.363 SNIP 0.705
- Scopus rating (2000): SJR 0.376 SNIP 0.485
- Scopus rating (1999): SJR 0.357 SNIP 0.438
Original language: English
DOIs: 10.1070/QE2013v043n09ABEH015231

**Bibliographical note**
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2013-12-29<br/>Publisher name: Turpion
Low Temperature Gold-to-Gold Bonded Semiconductor Disk Laser

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Rantamäki, A., Lindfors, J., Silvennoinen, M., Kontio, J., Tavast, M., Okhotnikov, O. G.
Number of pages: 4
Pages: 1062-1065
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: IEEE Photonics Technology Letters
Volume: 25
Issue number: 11
ISSN (Print): 1041-1135

Ratings:
Scopus rating (2016): CiteScore 2.52 SJR 1.018 SNIP 1.279
Scopus rating (2015): SJR 1.263 SNIP 1.327 CiteScore 2.62
Scopus rating (2014): SJR 1.461 SNIP 1.614 CiteScore 2.78
Scopus rating (2013): SJR 1.487 SNIP 1.547 CiteScore 2.95
Scopus rating (2012): SJR 1.623 SNIP 1.706 CiteScore 2.46
Scopus rating (2011): SJR 1.51 SNIP 2.012 CiteScore 2.48
Scopus rating (2010): SJR 1.474 SNIP 1.623
Scopus rating (2009): SJR 1.775 SNIP 1.804
Scopus rating (2008): SJR 2.081 SNIP 1.818
Scopus rating (2007): SJR 2.345 SNIP 1.566
Scopus rating (2006): SJR 2.112 SNIP 1.884
Scopus rating (2005): SJR 2.97 SNIP 2.454
Scopus rating (2004): SJR 3.286 SNIP 2.716
Scopus rating (2003): SJR 3.44 SNIP 2.467
Scopus rating (2002): SJR 3.566 SNIP 2.117
Scopus rating (2001): SJR 3.519 SNIP 1.678
Scopus rating (2000): SJR 2.345 SNIP 1.202
Scopus rating (1999): SJR 2.44 SNIP 1.302
Original language: English
DOIs: 10.1109/LPT.2013.2258147

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>
Portfolio EDEND: 2013-06-29<br/>
Publisher name: IEEE
Source: researchoutputwizard
Source-ID: 3224
Research output: Scientific - peer-review › Article

Mode-locked VECSEL emitting 5 ps pulses at 675 nm

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Ranta, S., Härkönen, A., Leinonen, T., Orsila, L., Lyytikäinen, J., Steinmeyer, G., Guina, M.
Number of pages: 3
Pages: 2289-2291
Publication date: 2013
Multiple Soliton Control in Fiber Lasers by Active Intensity Modulation

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Gumenyuk, R., Okhotnikov, O. G.
Number of pages: 3
Pages: 454-456
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: IEEE Photonics Technology Letters
Volume: 25
Issue number: 5
ISSN (Print): 1041-1135
Ratings:
Scopus rating (2016): CiteScore 2.52 SJR 1.018 SNIP 1.279
Scopus rating (2015): SJR 1.263 SNIP 1.327 CiteScore 2.62
Scopus rating (2014): SJR 1.461 SNIP 1.614 CiteScore 2.78
Scopus rating (2013): SJR 1.487 SNIP 1.547 CiteScore 2.95
Scopus rating (2012): SJR 1.623 SNIP 1.706 CiteScore 2.46
Multiple solitons grouping in fiber lasers by dispersion management and nonlinearity control

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Gumenyuk, R., Okhotnikov, O. G.
Number of pages: 6
Pages: 776-781
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Journal of the Optical Society of America B
Volume: 30
Issue number: 4
ISSN (Print): 0740-3224
Ratings:
Scopus rating (2016): CiteScore 1.81 SJR 0.894 SNIP 1.015
Scopus rating (2015): SJR 1.023 SNIP 1.002 CiteScore 1.78
Scopus rating (2014): SJR 1.188 SNIP 1.156 CiteScore 2.09
Scopus rating (2013): SJR 1.354 SNIP 1.281 CiteScore 2.33
Scopus rating (2012): SJR 1.517 SNIP 1.273 CiteScore 2.2
Scopus rating (2011): SJR 1.527 SNIP 1.495 CiteScore 2.33
Scopus rating (2010): SJR 1.47 SNIP 1.356
Scopus rating (2009): SJR 1.763 SNIP 1.59
Scopus rating (2008): SJR 1.645 SNIP 1.33
Scopus rating (2007): SJR 1.737 SNIP 1.29
Scopus rating (2006): SJR 1.644 SNIP 1.411
Scopus rating (2005): SJR 2.071 SNIP 1.686
Scopus rating (2004): SJR 1.974 SNIP 1.626
Scopus rating (2003): SJR 1.742 SNIP 1.414
Scopus rating (2002): SJR 1.754 SNIP 1.406
Scopus rating (2001): SJR 1.809 SNIP 1.394
Scopus rating (2000): SJR 1.778 SNIP 1.131
Multi-Watt Semiconductor Disk Laser by Low Temperature Wafer Bonding

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Rantamäki, A., Lyytikäinen, J., Heikkinen, J., Kontio, J. M., Okhotnikov, O. G.
Number of pages: 3
Pages: 2233-2235
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: IEEE Photonics Technology Letters
Volume: 25
Issue number: 22
ISSN (Print): 1041-1135
Ratings:
Scopus rating (2016): CiteScore 2.52 SJR 1.018 SNIP 1.279
Scopus rating (2015): SJR 1.263 SNIP 1.327 CiteScore 2.62
Scopus rating (2014): SJR 1.461 SNIP 1.614 CiteScore 2.78
Scopus rating (2013): SJR 1.487 SNIP 1.547 CiteScore 2.95
Scopus rating (2012): SJR 1.623 SNIP 1.706 CiteScore 2.46
Scopus rating (2011): SJR 1.51 SNIP 2.012 CiteScore 2.48
Scopus rating (2010): SJR 1.474 SNIP 1.623
Scopus rating (2009): SJR 1.775 SNIP 1.804
Scopus rating (2008): SJR 2.081 SNIP 1.818
Scopus rating (2007): SJR 2.345 SNIP 1.566
Scopus rating (2006): SJR 2.112 SNIP 1.884
Scopus rating (2005): SJR 2.97 SNIP 2.454
Scopus rating (2004): SJR 3.286 SNIP 2.716
Scopus rating (2003): SJR 3.44 SNIP 2.467
Scopus rating (2002): SJR 3.566 SNIP 2.117
Scopus rating (2001): SJR 3.519 SNIP 1.678
Scopus rating (2000): SJR 2.345 SNIP 1.202
Scopus rating (1999): SJR 2.44 SNIP 1.302
Original language: English
DOIs:
10.1109/LPT.2013.2284920

Optical amplifier with tailored dispersion for energy scaling of similaritons
Optimization of interfacial oxidation properties of FeCr SOFC interconnect alloy

General information
State: Published
Ministry of Education publication type: B2 Part of a book or another research book
Organisations: Optoelectronics Research Centre, Research group: Surface Science
Authors: Ali-Löytty, H., Jussila, P., Hirsimäki, M., Vaiden, M.
Number of pages: 2
Pages: 1-2
Publication date: 2013

Ordered multilayer silica-metal nanocomposites for second-order nonlinear optics

We use aerosol synthesis to fabricate ordered metal-silica nanocomposites consisting of alternating layers of pure silica and silica nanoparticles decorated with silver nanodots. These multilayer structures preserve the narrow plasmon resonance of the nanodots even for high optical densities and allow second-harmonic generation due to spontaneous symmetry breaking arising from the interfaces between silica and nanoparticle layers. Our concept opens up perspectives for complex structures for advanced optical applications.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Engineering materials science and solutions (EMASS), Frontier Photonics
Authors: Zdanowicz, M., Harra, J., Mäkelä, J. M., Heinonen, E., Ning, T., Kauranen, M., Genty, G.
Number of pages: 5
Pages: 1-5
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: APPLIED PHYSICS LETTERS
Volume: 103
Issue number: 25
Article number: 251907
ISSN (Print): 0003-6951
Ratings:
Scopus rating (2016): CiteScore 2.67 SJR 1.132 SNIP 0.996
Scopus rating (2015): SJR 1.085 SNIP 0.983 CiteScore 2.47
Scopus rating (2014): SJR 1.799 SNIP 1.462 CiteScore 3.25
Scopus rating (2013): SJR 2.149 SNIP 1.652 CiteScore 3.77
Scopus rating (2012): SJR 2.554 SNIP 1.754 CiteScore 3.76
Scopus rating (2011): SJR 2.805 SNIP 1.94 CiteScore 4.04
Scopus rating (2010): SJR 2.926 SNIP 1.789
Scopus rating (2009): SJR 2.857 SNIP 1.848
Scopus rating (2008): SJR 2.934 SNIP 1.83
Scopus rating (2007): SJR 3.039 SNIP 1.913
Scopus rating (2006): SJR 3.457 SNIP 2.288
Scopus rating (2005): SJR 3.709 SNIP 2.382
Scopus rating (2004): SJR 3.904 SNIP 2.38
Scopus rating (2003): SJR 3.765 SNIP 2.27
Scopus rating (2002): SJR 3.917 SNIP 2.365
Scopus rating (2001): SJR 4.111 SNIP 2.212
Scopus rating (2000): SJR 4.277 SNIP 2.013
Scopus rating (1999): SJR 4.35 SNIP 2.11
Original language: English
Electronic versions:
zdanowicz_ordered_multilayer_silica_metal_nanocomposites.pdf
DOIs:
10.1063/1.4852795
Links:
http://urn.fi/URN:NBN:fi:ttty-201409021421
Passively mode-locked red VECSEL

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Härkönen, A., Ranta, S., Leinonen, T., Lytyräinen, J., Guina, M.
Number of pages: 1
Pages: 1-1
Publication date: 2013

Host publication information
Title of host publication: 2013 Conference on Lasers and Electro-Optics Europe and International Quantum Electronics Conference, CLEO/EUROPE - IQEC 2013, 12-16 May 2013, Munich, Germany
Place of publication: Piscataway, NJ
Publisher: IEEE

Publication series
Name: European Conference on Lasers and Electro-Optics and the International Quantum Electronics Conference

Passively Mode-Locked Tm:YAG Ceramic Laser at 2 μm

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Frontier Photonics
Number of pages: 3
Publication date: 2013

Host publication information
Title of host publication: International Conference on Advanced Solid State Lasers 2013, October 27 - November 1, 2013, Paris, France
Place of publication: Washington, DC
Publisher: Optical Society of America
ISBN (Print): 978-1-55752-982-4

Publication series
Name: Advanced Solid State Lasers
DOIs: 10.1364/ASSL.2013.AF1A.2
Recent progress in wafer-fused VECSELs emitting in the 1310 nm and 1550 nm bands

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Sirbu, A., Caliman, A., Mereuta, A., Pierscinski, K., Rantamäki, A., Lyytikäinen, J., Rautiainen, J., Iakovlev, V., Volet, N., Okhotnikov, O., Kapon, E.
Number of pages: 11
Pages: 1-11
Publication date: 2013

Host publication information
Title of host publication: Vertical External Cavity Surface Emitting Lasers (VECSELs) III, SPIE Photonic West 2013, February 2-7, 2013, San Francisco, CA, USA.
Place of publication: Bellingham, WA, USA
Publisher: SPIE
ISBN (Print): 978-0-8194-9418-4

Publication series
Name: SPIE Conference Proceedings
Volume: 8606
ISSN (Print): 0277-786X
DOIs: 10.1117/12.2002461

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2013-06-29<br/>Publisher name: SPIE
Source: researchoutputwizard
Source-ID: 3431
Research output: Scientific - peer-review › Conference contribution

Scaling in the correlation energies of two-dimensional artificial atoms

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Quantum Control and Dynamics, Department of Physics, Computational Science X (CompX)
Authors: Odriazola, A., Ervasti, M. M., Makkonen, I., Delgado, A., Gonzalez, A., Räsänen, E., Harju, A.
Number of pages: 5
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Journal of Physics: Condensed Matter
Volume: 25
Issue number: 50
Article number: 505504
ISSN (Print): 0953-8984
Ratings:
Scopus rating (2016): CiteScore 1.89 SJR 0.881 SNIP 0.754
Scopus rating (2015): SJR 0.824 SNIP 0.754 CiteScore 1.65
Scopus rating (2014): SJR 1.217 SNIP 0.951 CiteScore 1.99
Scopus rating (2013): SJR 1.297 SNIP 1.022 CiteScore 2.11
Scopus rating (2012): SJR 1.659 SNIP 1.166 CiteScore 2.33
Scopus rating (2011): SJR 1.627 SNIP 1.166 CiteScore 2.31
Scopus rating (2010): SJR 1.654 SNIP 1.053
Scopus rating (2009): SJR 1.529 SNIP 1.019
Scopus rating (2008): SJR 1.475 SNIP 1.08
Scopus rating (2007): SJR 1.564 SNIP 1.15
Scopus rating (2006): SJR 1.665 SNIP 1.216
Scopus rating (2005): SJR 1.67 SNIP 1.189
Semiconductor disk lasers in fiber technology

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre
Authors: Okhotnikov, O. G.
Number of pages: 1
Pages: 1-1
Publication date: 2013

Host publication information
Title of host publication: International Conference on Coherent and Nonlinear Optics, International Conference on Lasers, Applications, and Technologies, ICONO/LAT 2013, June 18 - 20, 2013, Moscow, Russia
Place of publication: Moscow, Russia
Publisher: International Laser Center, Moscow State University

Publication series
Name: International Conference on Coherent and Nonlinear Optics, International Conference on Lasers, Applications, and Technologies
Links:

Bibliographical note
Invited talk
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2013-11-29<br/>Publisher name: International Laser Center, Moscow State University
Source: researchoutputwizard
Source-ID: 3049
Research output: Scientific - peer-review › Conference contribution

Silver-decorated silica nanoparticles in a multilayered plasmonic structure

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Research area: Aerosol Physics, Research group: Nonlinear Optics, Research area: Optics, Department of Materials Science, Department of Physics, Optoelectronics Research Centre
Authors: Harra, J., Zdanowicz, M., Virkki, M., Rantamäki, A., Honkanen, M., Genty, G., Kauranen, M., Mäkelä, J.
Number of pages: 1
Publication date: 2013

Host publication information
Title of host publication: EAC 2013, European Aerosol Conference, 1-6 September 2013, Prague, Czech Republic

Publication series
Name: European Aerosol Conference
Links:
Spatiotemporal Rogue Events in Optical Multiple Filamentation

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Department of Physics, Frontier Photonics
Authors: Birkholz, S., Nibbering, E. T., Bree, C., Skupin, S., Demircan, A., Genty, G., Steinmeyer, G.
Number of pages: 5
Pages: 1-5
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Physical Review Letters
Volume: 111
Article number: 243903
ISSN (Print): 1079-7114
Ratings:
Scopus rating (2016): CiteScore 6.33 SJR 3.56 SNIP 2.133
Scopus rating (2015): SJR 3.823 SNIP 2.205 CiteScore 5.76
Scopus rating (2014): SJR 5.027 SNIP 2.646 CiteScore 6.62
Scopus rating (2013): SJR 5.674 SNIP 2.796 CiteScore 7.46
Scopus rating (2012): SJR 6.243 SNIP 2.845 CiteScore 7.19
Scopus rating (2011): SJR 6.252 SNIP 2.886 CiteScore 7.02
Scopus rating (2010): SJR 6.418 SNIP 2.764
Scopus rating (2009): SJR 6.342 SNIP 2.94
Scopus rating (2008): SJR 6.223 SNIP 2.854
Scopus rating (2007): SJR 6.14 SNIP 2.862
Scopus rating (2006): SJR 5.645 SNIP 2.807
Scopus rating (2005): SJR 5.35 SNIP 2.938
Scopus rating (2004): SJR 5.312 SNIP 2.976
Scopus rating (2003): SJR 5.33 SNIP 2.93
Scopus rating (2002): SJR 5.441 SNIP 3.089
Scopus rating (2000): SJR 5.92 SNIP 3.111
Scopus rating (1999): SJR 6.185 SNIP 2.979
Original language: English
DOIs: 10.1103/PhysRevLett.111.243903

Tapered double-clad optical fibers as gain medium for high power lasers and amplifiers

General information
State: Published
Two-electron quantum dot in tilted magnetic fields: Sensitivity to the confinement model

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Computational Physics, Research group: Quantum Control and Dynamics, Department of Physics, Computational Science X (CompX)
Authors: Frostad, T., Hansen, J. P., Wesslen, C., Lindroth, E., Räsänen, E.
Number of pages: 6
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: European Physical Journal B
Volume: 86
Issue number: 10
Article number: 430
ISSN (Print): 1434-6028
Ratings:
Scopus rating (2016): SJR 0.452 SNIP 0.654 CiteScore 1.11
Scopus rating (2015): SJR 0.53 SNIP 0.744 CiteScore 1.13
Scopus rating (2014): SJR 0.657 SNIP 0.717 CiteScore 1.25
Scopus rating (2013): SJR 0.727 SNIP 0.805 CiteScore 1.42
Scopus rating (2012): SJR 0.851 SNIP 0.886 CiteScore 1.51
Scopus rating (2011): SJR 1.027 SNIP 0.924 CiteScore 1.6
Scopus rating (2010): SJR 1.087 SNIP 0.871
Scopus rating (2009): SJR 0.973 SNIP 0.815
Scopus rating (2008): SJR 1.099 SNIP 0.837
Scopus rating (2007): SJR 1.158 SNIP 0.933
Scopus rating (2006): SJR 1.146 SNIP 0.933
Scopus rating (2005): SJR 1.305 SNIP 0.958
Scopus rating (2004): SJR 1.3 SNIP 0.928
Scopus rating (2003): SJR 1.297 SNIP 0.856
Scopus rating (2002): SJR 1.396 SNIP 1.06
Scopus rating (2001): SJR 1.497 SNIP 1.025
Scopus rating (2000): SJR 1.843 SNIP 1.394
Scopus rating (1999): SJR 1.648 SNIP 1.156
Original language: English
DOIs:
10.1140/epjb/e2013-40677-x

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2013-12-29<br/>Publisher name: Springer
Source: researchoutputwizard
Source-ID: 2149
Research output: Scientific - peer-review › Article

Cost-effective Lidar Technology for Wind Energy

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Physics, Research area: Optics, Optoelectronics Research Centre, Vaisala Oyj
Authors: Järvinen, S., Toivonen, J., Kerttula, M. J. T., Filippov, V., Okhotnikov, O., Laukkanen, S., Valo, H.
Number of pages: 4
Pages: 187-190
Publication date: 25 Jun 2012

Host publication information
Title of host publication: Reviewed & Revised Papers Presented at the 26th International Laser Radar Conference
Volume: 2
Editors: Papayannis, A., Balis, D., Amiridis, V.
Article number: S1P-29
Research output: Scientific - peer-review › Conference contribution

1 W at 785 nm from a frequency-doubled wafer-fused semiconductor disk laser

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Rantamäki, A., Rautiainen, J., Lyytikäinen, J., Sirbu, A., Mereuta, A., Kapon, E., Okhotnikov, O. G.
Pages: 9046-9051
Publication date: 2012
Peer-reviewed: Yes

Publication information
Journal: Optics Express
Volume: 20
Issue number: 8
ISSN (Print): 1094-4087
Ratings:
Scopus rating (2016): CiteScore 3.48 SJR 1.487 SNIP 1.589
Scopus rating (2015): SJR 1.976 SNIP 1.755 CiteScore 3.78
Scopus rating (2014): SJR 2.349 SNIP 2.166 CiteScore 4.18
Scopus rating (2013): SJR 2.358 SNIP 2.226 CiteScore 4.38
Scopus rating (2012): SJR 2.587 SNIP 2.145 CiteScore 3.85
Scopus rating (2011): SJR 2.579 SNIP 2.606 CiteScore 4.04
Scopus rating (2010): SJR 2.943 SNIP 2.466
Scopus rating (2009): SJR 3.092 SNIP 2.669
Scopus rating (2008): SJR 3.195 SNIP 2.393
Scopus rating (2007): SJR 3.27 SNIP 2.032
Scopus rating (2006): SJR 3.233 SNIP 2.326
Scopus rating (2005): SJR 3.334 SNIP 2.379
Scopus rating (2004): SJR 2.833 SNIP 2.499
Scopus rating (2003): SJR 2.688 SNIP 2.193
Scopus rating (2002): SJR 1.547 SNIP 1.673
Scopus rating (2001): SJR 1.442 SNIP 1.39
Scopus rating (2000): SJR 1.246 SNIP 0.714
200 GHz 1 W semiconductor disc laser emitting 800 fs pulses

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Saarinen, E., Rantamäki, A., Chamorovskiy, A., Okhotnikov, O. G.
Pages: 1355-1356
Publication date: 2012
Peer-reviewed: Yes

Publication information
Journal: Electronics Letters
Volume: 48
Issue number: 21
ISSN (Print): 0013-5194
Ratings:
Scopus rating (2016): CiteScore 1.35 SJR 0.442 SNIP 0.882
Scopus rating (2015): SJR 0.497 SNIP 1.011 CiteScore 1.31
Scopus rating (2014): SJR 0.522 SNIP 1.061 CiteScore 1.31
Scopus rating (2013): SJR 0.59 SNIP 1.155 CiteScore 1.45
Scopus rating (2012): SJR 0.631 SNIP 1.161 CiteScore 1.45
Scopus rating (2011): SJR 0.634 SNIP 1.098 CiteScore 1.44
Scopus rating (2010): SJR 0.637 SNIP 1.011
Scopus rating (2009): SJR 0.728 SNIP 1.072
Scopus rating (2008): SJR 0.843 SNIP 0.957
Scopus rating (2007): SJR 0.924 SNIP 1.169
Scopus rating (2006): SJR 0.863 SNIP 1.192
Scopus rating (2005): SJR 1.048 SNIP 1.298
Scopus rating (2004): SJR 1.156 SNIP 1.354
Scopus rating (2003): SJR 1.372 SNIP 1.352
Scopus rating (2002): SJR 1.572 SNIP 1.202
Scopus rating (2001): SJR 1.591 SNIP 1.042
Scopus rating (2000): SJR 1.264 SNIP 0.951
Scopus rating (1999): SJR 1.443 SNIP 1.074
Original language: English
DOIs:
10.1049/el.2012.2443

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Publisher name: Institution of Engineering and Technology IET
Source: researchoutputwizard
Source-ID: 5233
Research output: Scientific - peer-review › Article

200 GHz 800 fs 1 W Semiconductor Disk Laser Mode-Locked by a SESAM with a Diamond Heat Spreader

General information
State: Published
2 W 1.2 µm flip-chip quantum dot semiconductor disk laser

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Research group: Ultrafast and intense lasers
Authors: Saarinen, E. J., Rantamäki, A., Chamorovskiy, A., Okhotnikov, O. G.
Publication date: 2012

Host publication information
Title of host publication: 15th International Conference Laser Optics 2012, St. Petersburg, 25-29 June 2012
Research output: Scientific - peer-review › Conference contribution

4.6-W Single Frequency Semiconductor Disk Laser With < 75-kHz Linewidth

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Rantamäki, A., Chamorovskiy, A., Lyytikäinen, J., Okhotnikov, O. G.
Pages: 1378-1380
Publication date: 2012
Peer-reviewed: Yes

Publication information
Journal: IEEE Photonics Technology Letters
Volume: 24
Issue number: 16
ISSN (Print): 1041-1135
Ratings:
Scopus rating (2016): CiteScore 2.52 SJR 1.018 SNIP 1.279
Scopus rating (2015): SJR 1.263 SNIP 1.327 CiteScore 2.62
Scopus rating (2014): SJR 1.461 SNIP 1.614 CiteScore 2.78
Scopus rating (2013): SJR 1.487 SNIP 1.547 CiteScore 2.95
Scopus rating (2012): SJR 1.623 SNIP 1.706 CiteScore 2.46
Scopus rating (2011): SJR 1.51 SNIP 2.012 CiteScore 2.48
Scopus rating (2010): SJR 1.474 SNIP 1.623
Scopus rating (2009): SJR 1.775 SNIP 1.804
Scopus rating (2008): SJR 2.081 SNIP 1.818
Scopus rating (2007): SJR 2.345 SNIP 1.566
Scopus rating (2006): SJR 2.112 SNIP 1.884
Scopus rating (2005): SJR 2.97 SNIP 2.454
Scopus rating (2004): SJR 3.286 SNIP 2.716
Scopus rating (2003): SJR 3.44 SNIP 2.467
Scopus rating (2002): SJR 3.566 SNIP 2.117
Scopus rating (2001): SJR 3.519 SNIP 1.678
Scopus rating (2000): SJR 2.345 SNIP 1.202
Scopus rating (1999): SJR 2.44 SNIP 1.302
Original language: English
DOIs:
Effect of different annealing temperatures and SiO2/Si(100) substrate on the properties of nickel containing titania thin sol-gel films

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research group: Surface Science, Frontier Photonics
Authors: Pärna, R., Joost, U., Nommiste, E., Kääambre, T., Kikas, A., Kuusik, I., Kink, I., Hirsimäki, M., Kisand, V.
Pages: 953-965
Publication date: 2012
Peer-reviewed: Yes
Publication information
Journal: Physica Status Solidi A: Applications And Materials Science
Volume: 209
Issue number: 5
ISSN (Print): 1862-6300
Ratings:
Scopus rating (2016): SJR 0.683 SNIP 0.849 CiteScore 1.69
Scopus rating (2015): SJR 0.688 SNIP 0.89 CiteScore 1.62
Scopus rating (2014): SJR 0.692 SNIP 0.901 CiteScore 1.56
Scopus rating (2013): SJR 0.772 SNIP 0.904 CiteScore 1.6
Scopus rating (2012): SJR 0.865 SNIP 0.929 CiteScore 1.53
Scopus rating (2011): SJR 0.964 SNIP 0.981 CiteScore 1.66
Scopus rating (2010): SJR 0.872 SNIP 0.794
Scopus rating (2009): SJR 0.918 SNIP 0.831
Scopus rating (2008): SJR 0.818 SNIP 0.791
Scopus rating (2007): SJR 1.003 SNIP 0.992
Scopus rating (2006): SJR 0.833 SNIP 0.791
Scopus rating (2005): SJR 0.776 SNIP 0.718
Scopus rating (2004): SJR 0.697 SNIP 0.632
Scopus rating (2003): SJR 0.832 SNIP 0.73
Scopus rating (2002): SJR 0.824 SNIP 0.806
Scopus rating (2001): SJR 0.824 SNIP 0.787
Scopus rating (2000): SJR 1.107 SNIP 0.914
Scopus rating (1999): SJR 0.866 SNIP 0.815
Original language: English
DOIs:
10.1002/pssa.201127641

Flip Chip Quantum-Dot Semiconductor Disk Laser at 1200 nm

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
1.3 µm Raman-bismuth fiber amplifier pumped by semiconductor disk laser

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Chamorovskiy, A., Rautiainen, J., Rantamäki, A., Golant, K., Okhotnikov, O. G.
Pages: 6433-6438
Publication date: 2011
Peer-reviewed: Yes

Publication information
Journal: Optics Express
Volume: 19
Issue number: 7
ISSN (Print): 1094-4087
Ratings:
Scopus rating (2016): CiteScore 3.48 SJR 1.487 SNIP 1.589
Scopus rating (2015): SJR 1.976 SNIP 1.755 CiteScore 3.78
Scopus rating (2014): SJR 2.349 SNIP 2.166 CiteScore 4.18
Effect of thermal management on the properties of saturable absorber mirrors in high-power mode-locked semiconductor disk lasers

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre
Authors: Rantamäki, A., Lyytikäinen, J., Nikkinen, J., Okhotnikov, O. G.
Pages: 786-789
Publication date: 2011
Peer-reviewed: Yes

Publication information
Journal: Quantum Electronics
Volume: 41
Issue number: 9
ISSN (Print): 1063-7818
Ratings:
Scopus rating (2016): SJR 0.491 SNIP 1.101 CiteScore 1.13
Scopus rating (2015): SJR 0.582 SNIP 1.193 CiteScore 1.07
Scopus rating (2014): SJR 0.531 SNIP 0.927 CiteScore 0.89
Scopus rating (2013): SJR 0.555 SNIP 1.062 CiteScore 0.94
Scopus rating (2012): SJR 0.433 SNIP 0.822 CiteScore 0.69
Scopus rating (2011): SJR 0.438 SNIP 0.911 CiteScore 0.7
Scopus rating (2010): SJR 0.415 SNIP 0.852
Scopus rating (2009): SJR 0.444 SNIP 1.039
Scopus rating (2008): SJR 0.459 SNIP 0.877
Scopus rating (2007): SJR 0.391 SNIP 0.776
Scopus rating (2006): SJR 0.286 SNIP 0.747
Scopus rating (2005): SJR 0.302 SNIP 0.719
Scopus rating (2004): SJR 0.272 SNIP 0.803
Scopus rating (2003): SJR 0.318 SNIP 0.547
Scopus rating (2002): SJR 0.253 SNIP 0.766
Low-noise Raman fiber amplifier pumped by semiconductor disk laser

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Chamorovskiy, A., Rautiainen, J., Rantamäki, A., Okhotnikov, O. G.
Pages: 6414-6419
Publication date: 2011
Peer-reviewed: Yes

Publication information
Journal: Optics Express
Volume: 19
Issue number: 7
ISSN (Print): 1094-4087
Ratings:
Scopus rating (2016): CiteScore 3.48 SJR 1.487 SNIP 1.589
Scopus rating (2015): SJR 1.976 SNIP 1.755 CiteScore 3.78
Scopus rating (2014): SJR 2.349 SNIP 2.166 CiteScore 4.18
Scopus rating (2013): SJR 2.358 SNIP 2.226 CiteScore 4.38
Scopus rating (2012): SJR 2.587 SNIP 2.145 CiteScore 3.85
Scopus rating (2011): SJR 2.579 SNIP 2.606 CiteScore 4.04
Scopus rating (2010): SJR 2.943 SNIP 2.466
Scopus rating (2009): SJR 3.092 SNIP 2.669
Scopus rating (2008): SJR 3.195 SNIP 2.393
Scopus rating (2007): SJR 3.27 SNIP 2.032
Scopus rating (2006): SJR 3.233 SNIP 2.326
Scopus rating (2005): SJR 3.334 SNIP 2.379
Scopus rating (2004): SJR 2.833 SNIP 2.499
Scopus rating (2003): SJR 2.688 SNIP 2.193
Scopus rating (2002): SJR 1.547 SNIP 1.673
Scopus rating (2001): SJR 1.442 SNIP 1.39
Scopus rating (2000): SJR 1.246 SNIP 0.714
Scopus rating (1999): SJR 1.381 SNIP 0.838
Original language: English
DOI: 10.1364/OE.19.006414
Multiple gain cavity for power scaling in passively mode-locked semiconductor disk laser

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Rantamäki, A., Saarinen, E. J., Lyytikäinen, J., Okhotnikov, O. G.
Number of pages: 5
Pages: 1-5
Publication date: 2011

Host publication information
Title of host publication: Laser Optics 2010, June 28, 2010 St Petersburg, Russia. Proceedings of SPIE
Place of publication: Bellingham, WA
Publisher: SPIE
Editors: Rosanov, N. N., Venediktov, V. Y.
Article number: 782209
ISBN (Print): 978-0-81948-331-7
DOIs:
10.1117/12.884968

Bibliographical note
Talk, TuR3-10<br/>Contribution: organisation=orc,FACT1=1
Source: researchoutputwizard
Source-ID: 7093
Research output: Scientific - peer-review › Conference contribution

Raman Fiber Oscillators and Amplifiers Pumped by Semiconductor Disk Lasers

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Chamorovskiy, A., Rautiainen, J., Rantamäki, A., Okhotnikov, O. G.
Pages: 1201-1207
Publication date: 2011
Peer-reviewed: Yes

Publication information
Journal: IEEE journal of quantum electronics
Volume: 47
Issue number: 9
ISSN (Print): 0018-9197
Ratings:
Scopus rating (2016): SJR 0.738 SNIP 1.103 CiteScore 1.74
Scopus rating (2015): SJR 0.966 SNIP 1.218 CiteScore 1.99
Scopus rating (2014): SJR 1.074 SNIP 1.227 CiteScore 1.95
Scopus rating (2013): SJR 1.333 SNIP 1.592 CiteScore 2.53
Scopus rating (2012): SJR 1.361 SNIP 1.577 CiteScore 2.19
Scopus rating (2011): SJR 1.296 SNIP 1.557 CiteScore 2.29
Scopus rating (2010): SJR 1.417 SNIP 1.695
Scopus rating (2009): SJR 1.875 SNIP 1.964
Scopus rating (2008): SJR 1.782 SNIP 1.738
Scopus rating (2007): SJR 2.09 SNIP 1.713
Scopus rating (2006): SJR 1.829 SNIP 1.86
Scopus rating (2005): SJR 2.821 SNIP 2.3
Scopus rating (2004): SJR 2.888 SNIP 2.512
Scopus rating (2003): SJR 2.687 SNIP 2.154
Scopus rating (2002): SJR 2.189 SNIP 1.924
Scopus rating (2001): SJR 2.518 SNIP 1.725
Scopus rating (2000): SJR 1.92 SNIP 1.344
The Impact of Thermal Management of Saturable Absorber on the Performance of Mode-Locked Semiconductor Disk Lasers

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Rantamäki, A., Lyytikäinen, J., Nikkinen, J., Okhotnikov, O. G.
Number of pages: 1
Pages: 1-1
Publication date: 2011

Host publication information
Title of host publication: 2011 Conference on and 12th European Quantum Electronics Conference Lasers and Electro-Optics Europe CLEO EUROPE/EQEC, May 22 - 26, 2011, Munich, Germany
Place of publication: Washington, DC
Publisher: OSA

Publication series
Name: European Quantum Electronics Conference Lasers and Electro-Optics Europe CLEO EUROPE/EQEC
Publisher: OSA
DOIs: 10.1109/CLEOE.2011.5942640

Bibliographical note
Poster CB.P.31.Ei ut-numeroa 3.5.2014<br/>Contribution: organisation=orc,FACT1=1
Source: researchoutputwizard
Source-ID: 7092
Research output: Scientific - peer-review › Conference contribution

1.38-µm mode-locked Raman fiber laser pumped by semiconductor disk laser

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre
Authors: Chamorovskiy, A., Rantamäki, A., Sirbu, A., Mereuta, A., Kapon, E., Okhotnikov, O.
Pages: 23872-23877
Publication date: 2010
Peer-reviewed: Yes

Publication information
Journal: Optics Express
Volume: 18
Issue number: 23
ISSN (Print): 1094-4087
Ratings:
Scopus rating (2016): CiteScore 3.48 SJR 1.487 SNIP 1.589
Scopus rating (2015): SJR 1.976 SNIP 1.755 CiteScore 3.78
Scopus rating (2014): SJR 2.349 SNIP 2.166 CiteScore 4.18
Scopus rating (2013): SJR 2.358 SNIP 2.226 CiteScore 4.38
3 W of 650 nm red emission by frequency doubling of wafer-fused semiconductor disk laser

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre
Authors: Rantamäki, A., Sirbu, A., Mereuta, A., Kapon, E., Okhotnikov, O. G.
Pages: 21645-21650
Publication date: 2010
Peer-reviewed: Yes

Publication information
Journal: Optics Express
Volume: 18
Issue number: 21
ISSN (Print): 1094-4087
Ratings:
Scopus rating (2016): CiteScore 3.48 SJR 1.487 SNIP 1.589
Scopus rating (2015): SJR 1.976 SNIP 1.755 CiteScore 3.78
Scopus rating (2014): SJR 2.349 SNIP 2.166 CiteScore 4.18
Scopus rating (2013): SJR 2.358 SNIP 2.226 CiteScore 4.38
Scopus rating (2012): SJR 2.587 SNIP 2.145 CiteScore 3.85
Scopus rating (2011): SJR 2.579 SNIP 2.606 CiteScore 4.04
Scopus rating (2010): SJR 2.943 SNIP 2.466
Scopus rating (2009): SJR 3.092 SNIP 2.669
Scopus rating (2008): SJR 3.195 SNIP 2.393
Scopus rating (2007): SJR 3.27 SNIP 2.032
Scopus rating (2006): SJR 3.233 SNIP 2.326
Scopus rating (2005): SJR 3.334 SNIP 2.379
Scopus rating (2004): SJR 2.833 SNIP 2.499
Scopus rating (2003): SJR 2.688 SNIP 2.193
Scopus rating (2002): SJR 1.547 SNIP 1.673
Scopus rating (2001): SJR 1.442 SNIP 1.39
Scopus rating (2000): SJR 1.246 SNIP 0.714

Original language: English
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Bibliographical note
Contribution: organisation=orc
FACT1=1
Source: researchoutputwizard
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Research output: Scientific - peer-review » Article
Passively mode locked semiconductor disk laser using multiple gain elements

General information
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Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Optoelectronics Research Centre
Authors: Rantamäki, A., Saarinen, E., Lyytikäinen, J., Okhotnikov, O. G.
Pages: p. 68
Publication date: 2010

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Title of host publication: Optics Days 2010 Proceedings, May 6-7, 2010, Tampere, Finland
Editor: Reith, C.

Bibliographical note
Contribution: organisation=orc,FACT1=1
Source: researchoutputwizard
Source-ID: 9078
Research output: Scientific › Conference contribution