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 focusses 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.

General information
State: Published
Organisations: Photonics
Authors: Ali-Löytty, H., Valden, M.
Publication date: 4 Dec 2017
Peer-reviewed: Unknown
Event: Paper presented at Joint Annual Meeting of Finnish Synchrotron Radiation User Organisation (FSRUO) and Finnish Structural Biology Network (FinnBox), Turku, Finland.
Electronic versions:
Ali-Löytty- FSRUO poster
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.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Photonics, Research group: ORC, Research group: Surface Science, Okmetic Oyj, Nortase 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.
Number of pages: 4
Pages: 2023-2026
Publication date: 1 Dec 2017
Peer-reviewed: Yes

Publication information
Journal: IEEE Photonics Technology Letters
Volume: 29
Issue number: 23
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
Multi-material bio-printing facilities
Dispenser printing provides a method to produce 2D and 3D patterns from basically any liquid phase material. Dispensing considered here is a form of extrusion of material through a narrow diameter needle. An advantage of dispensing technique over conventional printing techniques is the avoidance of complicated ink formulation, which generally requires hazardous organic solvents that may be harmful to biological objects. Dispensing also allows materials with rather different properties such as different viscosity to be printed in the same process. Combining the dispensing printing of liquid phase materials and 3D printing of solid materials, complex structures with new functional properties can be fabricated, which is very challenging if not impossible using conventional manufacturing techniques.

General information
State: Published
Organisations: Faculty of Biomedical Sciences and Engineering, Research group: Sensor Technology and Biomeasurements (STB), Research group: Nanoscale Phenomena and Measurements (NPM)
Authors: Virtanen, J., Tuukkanen, S.
Number of pages: 1
Publication date: 3 Oct 2017
Peer-reviewed: Unknown
Keywords: printing, nanocellulose
Electronic versions:

BMT-day_poster
Links:

Research output: Scientific - peer-review › Article

High power VECSEL prototype emitting at 625 nm
We demonstrate an OP-VECSEL prototype emitting more than 6W of CW output power at 625 nm. We employ dilute nitride (GaInNAs) quantum wells emitting fundamentally at 1250 nm together with intracavity frequency doubling.

General information
State: Published
Decreasing Defect-State Density of Al2O3/GaIn1-xAs Device Interfaces with InOx Structures

Control of defect densities at insulator/GaIn1-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.

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.

General information
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
State: Published
Ministry of Education publication type: A2 Review article in a scientific journal
Organisations: Photonics, Research group: ORC
Authors: Guina, M., Rantamäki, A., Härkönen, A.
Number of pages: 37
Publication date: 23 Aug 2017
Peer-reviewed: Yes

Publication information
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Issue number: 38
Article number: 383001
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
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
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
Authors: Penttinen, J., Leinonen, T., Burd, S., Guina, M.
Publication date: 23 Aug 2017
Peer-reviewed: Unknown
Event: Paper presented at The 25th Colloquium on High-Resolution Molecular Spectroscopy, Helsinki, Finland.
ASJC Scopus subject areas: Atomic and Molecular Physics, and Optics
Keywords: VECSEL
Electronic versions:
HRMS_2017_Penttinen_abstract
Links:
Research output: Scientific › Paper, poster or abstract

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.
Publication date: 16 Aug 2017
Peer-reviewed: Unknown
Keywords: VECSEL
ASJC Scopus subject areas: Atomic and Molecular Physics, and Optics
Electronic versions:
nacti_abstract_penttinen
Links:
Research output: Scientific › Paper, poster or abstract

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.

General information
State: Published
Organisations: Photonics, Research group: Ultrafast and intense lasers
Authors: Guina, M., Penttinen, J., Rantamäki, A. J., Kantola, E. L.
Publication date: 23 Jun 2017
Peer-reviewed: Unknown
Event:
Additional files:
LIC'17_MGuina_VECSELs_invited
Links:
Research output: Scientific › Paper, poster or abstract

Transverse structure optimization of distributed feedback and distributed Bragg reflector lasers with surface gratings
Two figures of merit for single transverse mode operation and an accurate procedure for calculating the coupling coefficient in distributed feedback lasers with laterally-coupled ridge-waveguide surface grating structures and in
distributed Bragg reflector lasers with etched-through-ridge-waveguide surface gratings are introduced. Based on the
difference in optical confinement between the pumped and un-pumped regions in the transverse plane, the single
transverse mode operation figures of merit are effective and easy to calculate, while the improved coupling coefficient
calculation procedure gives experimentally confirmed better results than the conventional calculation approaches,
particularly for surface gratings with variable refractive index in the grating areas.

General information
State: E-pub ahead of print
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Photonics, Research group: Semiconductor Technology and Applications
Authors: Uusitalo, T., Virtanen, H., Dumitrescu, M.
Number of pages: 11
Publication date: Jun 2017
Peer-reviewed: Yes

Publication information
Journal: Optical and Quantum Electronics
Volume: 49
Issue number: 6
Article number: 206
ISSN (Print): 0306-8919
Ratings:
Scopus rating (2016): CiteScore 1.02 SJR 0.321 SNIP 0.629
Scopus rating (2015): SJR 0.392 SNIP 0.668 CiteScore 1.05
Scopus rating (2014): SJR 0.373 SNIP 0.591 CiteScore 0.98
Scopus rating (2013): SJR 0.547 SNIP 0.861 CiteScore 1.29
Scopus rating (2012): SJR 0.473 SNIP 0.787 CiteScore 0.95
Scopus rating (2011): SJR 0.463 SNIP 0.617 CiteScore 0.77
Scopus rating (2010): SJR 0.439 SNIP 0.517
Scopus rating (2009): SJR 0.688 SNIP 0.645
Scopus rating (2008): SJR 0.562 SNIP 0.646
Scopus rating (2007): SJR 0.66 SNIP 0.654
Scopus rating (2006): SJR 0.558 SNIP 0.549
Scopus rating (2005): SJR 0.754 SNIP 0.695
Scopus rating (2004): SJR 0.87 SNIP 0.87
Scopus rating (2003): SJR 0.871 SNIP 0.717
Scopus rating (2002): SJR 0.679 SNIP 0.705
Scopus rating (2001): SJR 0.691 SNIP 0.608
Scopus rating (2000): SJR 0.682 SNIP 0.579
Scopus rating (1999): SJR 1.175 SNIP 0.759
Original language: English
DOIs: 10.1007/s11082-017-1039-y
Links:
Research output: Scientific - peer-review › Article

Pyrolysed cellulose nanofibrils and dandelion pappus in supercapacitor application
Dandelion pappus and wood based nanocellulose fibrils were combined to form films that were subsequently pyrolyzed
under low-pressure conditions in a carbon monoxide (CO) rich atmosphere to make supercapacitor electrode material.
The electrodes were prepared from these materials and pyrolysed under low-pressure conditions in a carbon monoxide-
rich atmosphere. The electrode materials and assembled supercapacitors were electrically and structurally characterized.
The assembled six supercapacitors showed specific capacitances per electrode ranging from 1 to 6 F/g and surface
resistance of pyrolyzed electrodes ranging from 30 to 170 Ω/□. Finally, equivalent series resistance and leakage current
measurements were conducted for three samples, resulting values from 125 to 500 Ω and from 0.5 to 5.5 µA, respectively.

General information
State: E-pub ahead of print
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Faculty of Biomedical Sciences and Engineering, Research area: Microsystems, Electronics and
Communications Engineering, Materials Science, Research group: Plastics and Elastomer Technology, Research group:
Plastics and Elastomer Technology, Research area: Measurement Technology and Process Control, Research group:
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.

**General information**

State: Published

Ministry of Education publication type: A1 Journal article-refereed

Organisations: Photonics, Research group: Surface Science, Department of Physics and Astronomy, Russian Acad Sci, Ioffe Physical Technical Institute, Russian Academy of Sciences, Ioffe Phys Tech Inst

Authors: Kuzmin, M., Lahtonen, K., Vuori, L., Sánchez-de-Armas, R., Hirsimäki, M., Valden, M.

Number of pages: 6

Pages: 111-116

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Peer-reviewed: Yes

**Publication information**

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Volume: 409

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Ratings:

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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: Cu(100), STM, Glycine, Glycinate, DFT, Self-assembly, Nanoscience

ASJC Scopus subject areas: Surfaces and Interfaces, Condensed Matter Physics, Metals and Alloys

Electronic versions:

Pre-print Manuscript

DOIs:

10.1016/j.apsusc.2017.03.005

Links:

http://urn.fi/URN:NBN:fi:ttty-201704181304

Research output: Scientific - peer-review › Article

**Multi-wavelength mid-IR light source for gas sensing**

**General information**

State: Published

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


Publication date: 20 Feb 2017

Host publication information
Analysis of the photon–photon resonance influence on the direct modulation bandwidth of dual-longitudinal-mode distributed feedback lasers

The paper explores the possibilities to extend the direct modulation bandwidth in dual-longitudinal-mode distributed feedback lasers by exploiting the photon–photon resonance induced by the interaction of the two modes in the laser cavity. The effects on the direct amplitude modulation and on the direct modulation of the difference frequency between the two modes are analyzed using simulation and experimental results. When the photon–photon resonance, which occurs at the difference frequency between the two modes, is properly placed at a higher frequency than the carrier-photon resonance, the small-signal amplitude modulation (AM) bandwidth of the laser can be significantly increased. However, both simulations and experiments point out that a high small-signal AM bandwidth does not lead to a high large-signal AM bandwidth if the small-signal modulation response has significant variations across the modulation bandwidth. The paper shows that a high large-signal AM bandwidth is obtained when the two modes are significantly unbalanced, whereas a high-bandwidth difference frequency modulation can be best detected when the two modes are balanced and the DC bias is properly chosen.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Photonics, Research group: Semiconductor Technology and Applications, Department of Electronics and Telecommunications Politecnico di Torino
Authors: Uusitalo, T., Virtanen, H., Bardella, P., Dumitrescu, M.
Number of pages: 14
Publication date: 5 Jan 2017
Peer-reviewed: Yes

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Article number: 46
ISSN (Print): 0306-8919
Ratings:
Scopus rating (2016): CiteScore 1.02 SJR 0.321 SNIP 0.629
Scopus rating (2015): SJR 0.392 SNIP 0.668 CiteScore 1.05
Scopus rating (2014): SJR 0.373 SNIP 0.591 CiteScore 0.98
Scopus rating (2013): SJR 0.547 SNIP 0.861 CiteScore 1.29
Scopus rating (2012): SJR 0.473 SNIP 0.787 CiteScore 0.95
Scopus rating (2011): SJR 0.463 SNIP 0.617 CiteScore 0.77
Scopus rating (2010): SJR 0.439 SNIP 0.517
Scopus rating (2009): SJR 0.688 SNIP 0.645
Scopus rating (2008): SJR 0.562 SNIP 0.646
Scopus rating (2007): SJR 0.66 SNIP 0.654
Scopus rating (2006): SJR 0.558 SNIP 0.549
Scopus rating (2005): SJR 0.754 SNIP 0.695
Scopus rating (2004): SJR 0.87 SNIP 0.87
Scopus rating (2003): SJR 0.871 SNIP 0.717
Scopus rating (2002): SJR 0.679 SNIP 0.705
Roll-to-roll manufacturing of disposable surface-enhanced Raman scattering (SERS) sensors on paper based substrates

We present two cost-effective routes for roll-to-roll (R2R) manufacturing of silver nanoparticle based surface-enhanced Raman scattering (SERS) active substrates on paper utilizing either inkjet printing or liquid flame spray (LFS) nanoparticle deposition. Paper is cost-effective, renewable, recyclable, and biodegradable that can easily be disposed after the SERS analysis. Paper based substrates can have a strong luminescence that can overshadow the rather weak SERS signal. Two solutions are presented here that solve the luminescence issue of the base paper substrate. A full silver coverage by inkjet printing or alternatively a simple flexography carbon coating can suppress the background luminescence allowing a reliable SERS characterization. The detection limit of the sample analyte crystal violet was 100 nM corresponding to 100 fmol in a 1 µl sample volume. These approaches can provide a cost-effective route towards disposable, point-of-care SERS active substrates.
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.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Photonics, Research group: ORC
Authors: Campesato, R., Tukiainen, A., Aho, A., Gori, G., Isoaho, R., Greco, E., Guina, M.
Publication date: 2017

Host publication information
Title of host publication: Proceedings of the 11th European Space Power Conference 2016
Publisher: EDP Sciences
Article number: 03003

Publication series
Name: E3S Web of Conferences
Volume: 16
ISSN (Electronic): 2267-1242
Electronic versions:
e3sconf_espc2017_03003
DOIs:
10.1051/e3sconf/20171603003
Links:
http://urn.fi/URN:NBN:fi:tty-201706201604
Research output: Scientific - peer-review › Conference contribution

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.
Publication date: 2017
Peer-reviewed: Unknown
Event: Paper presented at 19th European Workshop on Molecular Beam Epitaxy, St. Petersburg,
Research output: Scientific - peer-review › Paper, poster or abstract

Chasing measurements for real-world emissions of city buses

General information
State: Published
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 1×10¹⁶ 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 1×10¹⁶ 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.

Dilute Nitride Solar Cells - Technology Developments Towards 50% Efficiency

The optical properties of noble metals arise from the plasmonic oscillations of conduction electrons. The plasmon resonances can give rise to strong local fields (“hotspots”) near metal surfaces. For nanoparticles (NPs), localized surface plasmons (LSP) exhibit a high degree of optical field confinement. LSP resonances of individual NPs are sensitive to their size and shape, type of metal, and dielectric environment. However, the quality of the LSP resonances (line width and field enhancement) depends on the lifetime of the localized plasmonic excitations. The longer is the plasmon lifetime, the narrower the linewidth and the stronger the field enhancement will be.

A pioneering pathway to improve the optical response of plasmonic systems is to use plasmonic Fano resonances (PFR). The PFR, which is the result of the interference between bright (superradiant) and dark (subradiant) modes in metallic nanostructures, gives rise to reduced radiative loss resulting in strong near-field enhancement and a tunable resonance. Here, a simple structure composed of exquisitely-controlled assembly of a nanodimer consisting of a metal nanosphere and nanorod is designed to generate PFR in the near infrared region.

We investigated and analyzed the dependence of the PFR in such a structure on its geometrical parameters such as the size of the rod and the sphere, their interparticle separation. We also addressed different excitation polarization, including linear, azimuthal, and radial polarizations. We show that PFR is polarization-dependent and exhibits high sensitivity to the geometrical parameters. In order to verify that this structure can generate a second-harmonic generation (SHG) response, we calculated the extinction cross-section and the near-field distributions at the fundamental and SHG wavelengths. In addition to that, the preliminary experimental results agree with the numerical study, indicating that an excitation at the PRF resonance leads to an enhancement of the SHG response of the rod-sphere metallic nanodimer.
Identifying criteria for environmental risk assessment models at different stage-gates of nano-material/product innovation considering requirements of various stakeholders

General information
State: Published
Organisations: Physics, Research area: Aerosol Physics, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group
Authors: Sørensen, S. N., Hansen, S. F., Baun, A., Spurgeon, D., Matzke, M., Schirmer, K., Burkard, M., Dal Maso, M., Poikkimäki, M., Verschoor, A., Quik, J., Peijnenburg, W., Wigger, H., Nowack, B.
Publication date: 2017
Peer-reviewed: Unknown
Research output: Scientific › Paper, poster or abstract

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

**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

**Sensitivity analysis of a model characterizing nanoparticle agglomeration, dispersion and deposition processes in the atmosphere**

**General information**  
State: Published  
Organisations: Physics, Research area: Aerosol Physics, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group, Research group: Aerosol Synthesis  
Authors: Poikkimäki, M., Juuti, P., Kalliokoski, J., Dal Maso, M.  
Publication date: 2017  
Peer-reviewed: Unknown  
Event: Paper presented at 8th International Symposium on Nanotechnology, Occupational and Environmental Health,  
Research output: Scientific › Paper, poster or abstract

**Sensitivity analysis of a model characterizing nanoparticle agglomeration, dispersion and deposition processes in the atmosphere**

Abstract T104N388

**General information**  
State: Published  
Organisations: Faculty of Natural Sciences, Physics, Research area: Aerosol Physics, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group, Research group: Aerosol Synthesis  
Authors: Poikkimäki, M., Juuti, P., Kalliokoski, J., Dal Maso, M.  
Publication date: 2017  
Peer-reviewed: Unknown
Simultaneous modelling of dispersion and aerosol dynamics of workplace aerosol

General information
State: Published
Organisations: Physics, Research area: Aerosol Physics, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group, Tampere University of Technology
Publication date: 2017
Peer-reviewed: Unknown

Thermal Modification of ALD Grown Titanium Oxide Ultra Thin Film for Photoanode Applications

General information
State: Published
Organisations: Optoelectronics Research Centre, Research group: Surface Science
Authors: Hannula, M. K., Lahtonen, K. T., Isotalo, T. J., Saari, J. S., Valden, M. O.
Publication date: 15 Dec 2016
Peer-reviewed: Unknown
Event: Paper presented at Symposium on Future Prospects for Photonics, Tampere, Finland.
ASJC Scopus subject areas: Renewable Energy, Sustainability and the Environment, Surfaces, Coatings and Films, Surfaces and Interfaces, Atomic and Molecular Physics, and Optics
Keywords: Titanium dioxide, titanium silicide, Atomic layer deposition (ALD), photoemission electron microscopy, PEEM, hydrogen energy
Research output: Scientific › Paper, poster or abstract

High power (60 mW) GaSb-based 1.9 μm superluminescent diode with cavity suppression element

The characteristics and the fabrication of a 1.9 μm superluminescent diode utilizing a cavity suppression element are reported. The strong suppression of reflections allows the device to reach high gain without any sign of lasing modes. The high gain enables strong amplified spontaneous emission and output power up to 60 mW in a single transverse mode. At high gain, the spectrum is centered around 1.9 μm and the full width at half maximum is as large as 60 nm. The power and spectral characteristics pave the way for demonstrating compact and efficient light sources for spectroscopy. In particular, the light source meets requirements for coupling to silicon waveguides and fills a need for leveraging to mid-IR applications photonics integration circuit concepts exploiting hybrid integration to silicon technology.

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, Facilities and Infrastructure
Authors: Zia, N., Viheriälä, J., Koskinen, R., Aho, A., Suomalainen, S., Guina, M.
Number of pages: 3
Publication date: 6 Dec 2016
Peer-reviewed: Yes
Publication information
Volume: 109
Issue number: 23
Article number: 231102
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
Biomaterials for Electronics

Challenges of climate change, ecological scarcity and depletion of natural resources form a global push towards a bioeconomy, which means shifting from fossil to renewable raw materials. Wood biomass will likely get a significant role in the Finnish bioeconomy. Finnish economy has conventionally focused on bulk products, while the challenge in the future is to bring high added value to the fibre based components and products. Cellulose based nanomaterials are low-cost, strong, porous, lightweight, solution processable, biocompatible, biodegradable and piezoelectric biomaterials, which have obvious applications for example in biomedical and electronic applications.

Piezoelectric sensors are widely applicable for various healthcare and well-being applications. We have recently studied flexible piezoelectric sensors made from commercial PVDF films and printable PVDF-TrFE ink, as well as biodegradable films from wood-based cellulose nanofibrils (CNF) [1] and bacterial cellulose (BC).

The high porosity of CNF makes it also a promising material for supercapacitors, also known as electrochemical double-layer capacitors (EDLC). We have recently demonstrated the fabrication of supercapacitor electrodes from a mixture of CNF and dandelion using high temperature pyrolysis.

References:

General information

State: Published
Organisations: Faculty of Biomedical Sciences and Engineering, Department of Automation Science and Engineering, Research area: Micromechatronics, Research area: Measurement Technology and Process Control, University of Twente, Faculty of Biomedical Sciences and Engineering, Tampere University of Technology
Authors: Pammo, A., Schouten, M., Virtanen, J., Tuukkanen, S.
Number of pages: 1
Pages: 1-1
Publication date: 25 Nov 2016
Peer-reviewed: Unknown
Event:
ASJC Scopus subject areas: Biomaterials, Materials Science(all), Electrical and Electronic Engineering
Keywords: biomaterial, piezoelectric sensor, nanocellulose, bacterial cellulose, supercapacitor, PVDF-TrFE
Research output: Scientific › Paper, poster or abstract
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 $1S_0\rightarrow1P_1$ transition of neutral Mg. Using an externally frequency-quadrupled VECSEL, we implement Doppler cooling of Mg$^{2+}$ on the $2S_{1/2}\leftrightarrow2P_{3/2}$ cycling transition, repumping on the $2S_{1/2}\leftrightarrow2P_{1/2}$ 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
Peer-reviewed: Yes

Publication information
Journal: Optica
Volume: 3
Issue number: 12
Article number: 268119
ISSN (Print): 2334-2536
Ratings:
Scopus rating (2016): CiteScore 8.05 SJR 5.003 SNIP 3.77
Scopus rating (2015): SNIP 2.943 SJR 4.669 CiteScore 7
Original language: English
Keywords: Semiconductor lasers, Lasers, frequency doubled, Laser cooling, Quantum information and processing, Spectroscopy, high-resolution, Spectroscopy, trapped ion
ASJC Scopus subject areas: Atomic and Molecular Physics, and Optics
DOIs: 10.1364/OPTICA.3.001294
Research output: Scientific - peer-review > Article

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
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 overlay 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.

Fabrication of topographically microstructured titanium silicide interface for advanced photonic applications

We present a widely scalable, high temperature post-growth annealing method for converting ultra-thin films of TiO2 grown by atomic layer deposition to topographically microstructured titanium silicide (TiSi). The photoemission electron microscopy results reveal that the transformation from TiO2 to TiSi at 950 °C proceeds via island formation. Inside the islands, TiO2 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.
**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:**  
10.1016/j.scriptamat.2016.03.016  
**Research output:** Scientific - peer-review › Article

**Titanium Nitride Microelectrodes Deposited by Ion Beam Assisted E-beam Evaporation**

An alternative method for fabricating titanium nitride (TiN) microelectrodes is presented. In order to decrease the impedance and noise levels of microelectrodes, one of the most common methods is to coat the electrodes with TiN. Usually that has required the use of a sputtering device, but we have demonstrated that also an e-beam coater can be used for TiN deposition, if equipped with an ion source. Our first 30 µm microelectrodes fabricated by ion beam assisted deposition (IBAD) have impedances around 75 kΩ, which is close to the impedances reported for sputter deposited TiN microelectrodes.

**General information**

**State:** Published  
**Organisations:** Department of Automation Science and Engineering, Research area: Microsystems, Research area: Measurement Technology and Process Control, University of Tampere, NeuroGroup, BioMediTech  
**Authors:** Ryynänen, T., Toivanen, M., Narkilahti, S., Lekkala, J.  
**Publication date:** 24 Jun 2016  
**Peer-reviewed:** Unknown  
**Keywords:** microelectrode, Titanium nitride, e-Beam evaporation, Ion beam assisted deposition, MEA  
**DOIs:**  
doi: 10.3389/conf.fnins.2016.93.00123  
**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.
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.
High-Power Tapered Distributed Bragg Reflector Laser Diodes Emitting at 1550 nm

Compact LIDAR systems work in the near infrared (NIR) area, more specifically at wavelengths around 800 nm to 900 nm. In adverse weather the measurement range decreases dramatically as the light is attenuated by rain drops or fog. The penetration length can be improved by increasing the optical peak power of the lasers, but in the NIR spectral range the maximum emission power permitted due to eye safety is very limited and almost reached by the current systems. A significantly higher optical power can be used in the short wave infrared (SWIR) range. LIDAR systems working, for example, at 1550 nm are employed in military applications. However, these LIDAR systems are very bulky. This paper presents a compact high-power single-mode 1.55 µm laser diode for LIDAR applications.

The AlGaInAs/InP distributed Bragg reflector (DBR) lasers comprise a passive DBR section, an active ridge waveguide (RWG) section and tapered gain-guided sections of different lengths and have been fabricated without regrowth. Measurements indicate that the output power scales with the length of the tapered section and hint that one of the limiting factors for power scaling with the tapered section length is the non-uniform heating of the chip. According to thermal simulations, the non-uniform heating seems to cause devices with a long tapered section to roll-over at a much lower average power density than devices with a shorter tapered section.

Typical devices emit up to 560 mW in single-mode continuous wave operation at room temperature with a high spectral purity (38 dB side-mode suppression ratio, SMSR, at maximum power). By changing the length of the tapered section from 0.5 mm to 4.0 mm the maximum power could be increased from 125 mW to 560 mW. The tapered section and the RWG section are driven with separate currents. The maximum power was achieved with 10 A current to the tapered section and 350 mA current to the RWG section. The peak emission wavelength can be tuned by more than 2 nm either by changing the tapered section current (at a rate of about 0.4 nm/A) or by changing the temperature (at a rate of about 0.1 nm/°C, between 10 °C to 40 °C).
High-resolution x-ray diffraction and photoluminescence study of high-quality self-catalyzed GaAs nanowires

General information
State: Published
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications
Authors: Koivusalo, E. S., Hakkarainen, T. V., Guina, M.
Publication date: 17 May 2016
Peer-reviewed: Unknown
Event: Paper presented at Optics and Photonics days, Tampere, Finland.
Keywords: GaAs nanowires, Self-catalyzed, X-ray diffraction, Photoluminescence
Research output: Scientific > Paper, poster or abstract

Novel self-catalyzed GaAs nanowires with electrical contacts

General information
State: Published
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications
Authors: Rizzo Piton, M., Koivusalo, E. S., Suomalainen, S. J., Hakkarainen, T. V., Guina, M.
Publication date: 17 May 2016
Peer-reviewed: Unknown
Event: Paper presented at Optics and Photonics days, Tampere, Finland.
Research output: Scientific > Paper, poster or abstract

Structural and Electrical Characterization of Solution-Processed Electrodes for Piezoelectric Polymer Film Sensors

Solution-processable graphene and carbon nanotube-based electrode materials were used here to provide electrodes on flexible piezoelectric polyvinylidenefluoride sensors. Piezoelectric sensitivity measurements, image-based analysis, adhesion tests, and sheet resistance measurements were applied to these printable sensors to rigorously analyze their performance and structure. The printable sensors showed electrical performance similar to metallized sensors, whereas the adhesion of the solution-processed materials to the substrate is not as high as that of the evaporated metal films. This also affects the measured sensor sensitivity values. The measurements based on optical images were found to be a promising method to capture detailed information about the electrode surface structure.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Automation Science and Engineering, Research area: Microsystems, Research area: Measurement Technology and Process Control
Authors: Rajala, S., Mettänen, M., Tuukkanen, S.
Number of pages: 8
Pages: 1692-1699
Publication date: 15 Mar 2016
Peer-reviewed: Yes

Publication information
Journal: IEEE Sensors Journal
Volume: 16
Issue number: 6
ISSN (Print): 1530-437X
Ratings:
Scopus rating (2016): CiteScore 3.12 SJR 0.706 SNIP 1.689
Scopus rating (2015): SJR 0.684 SNIP 1.908 CiteScore 2.85
Scopus rating (2014): SJR 0.799 SNIP 1.934 CiteScore 2.5
Scopus rating (2013): SJR 0.666 SNIP 1.811 CiteScore 2.6
Scopus rating (2012): SJR 0.602 SNIP 1.445 CiteScore 2.09
Scopus rating (2011): SJR 0.572 SNIP 1.421 CiteScore 2.13
Scopus rating (2010): SJR 0.533 SNIP 1.077
Scopus rating (2009): SJR 0.631 SNIP 1.351
Scopus rating (2008): SJR 0.641 SNIP 1.371
Scopus rating (2007): SJR 0.785 SNIP 1.484
Difference frequency modulation of multi-section dual-mode lasers with nanoscale surface gratings

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: Nanophotonics, Facilities and Infrastructure
Authors: Uusitalo, T., Virtanen, H., Viheriälä, J., Salmi, J., Aho, A. T., Dumitrescu, M.
Number of pages: 9
Publication date: 7 Mar 2016

Host publication information
Title of host publication: SPIE Proceedings : Novel In-Plane Semiconductor Lasers XV
Volume: 9767
Publisher: SPIE
Editors: Belyanin, A. A., Smowton, P. M.
Article number: 97670S

Publication series
Name: Proceedings of SPIE
ISSN (Electronic): 0277-786X
Keywords: Frequency modulation, lasers, Nanotechnology, Modulation, Nanoimprint lithography, Quantum dots, terahertz radiation, ultraviolet radiation, distributed feedback laser diodes
DOIs:
10.1117/12.2213888

Bibliographical note
INT=orc,"Aho, Antti T."
JUFOID=71479
Research output: Scientific - peer-review ➔ Conference contribution

Ambient-Pressure XPS Study of a Ni-Fe Electro catalyst for the Oxygen Evolution Reaction
Chemical analysis of solid-liquid interfaces under electrochemical conditions has recently become feasible due to the development of new synchrotron radiation techniques. Here we report the use of "tender" X-ray ambient-pressure X-ray photoelectron spectroscopy (APXPS) to characterize a thin film of Ni-Fe oxyhydroxide electrodeposited on Au as the working electrode at different applied potentials in 0.1 M KOH as the electrolyte. Our results show that the as-prepared 7 nm thick Ni-Fe (50% Fe) film contains Fe and Ni in both their metallic as well as oxidized states, and undergoes further oxidation when the sample is subjected to electrochemical oxidation-reduction cycles. Metallic Fe is oxidized to Fe$^{3+}$ and metallic Ni to Ni$^{2+/3+}$. This work shows that it is possible to monitor the chemical nature of the Ni-Fe catalyst as a function of potential when the corresponding current densities are small. This allows for operando measurements just above the onset of OER; however, current densities as they are desired in photoelectrochemical devices (∼1-10 mA cm$^{-2}$) could not be achieved in this work, due to ohmic losses in the thin electrolyte film. We use a two-dimensional model to describe the spatial distribution of the electrochemical potential, current density, and pH as a function of the position above the electrolyte meniscus, to provide guidance toward enabling the acquisition of operando APXPS at high current density. The shifts in binding energy of water with applied potential predicted by the model are in good agreement with the experimental...
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.
Color Bricks: Building Highly Organized and Strongly Absorbing Multicomponent Arrays of Terpyridyl Perylenes on Metal Oxide Surfaces

Terpyridine-substituted perylenes containing cyclic anhydrides in the peri position were synthesized. The anhydride group served as an anchor for assembly of the terpyridyl-crowned chromophores as monomolecular layers on metal oxide surfaces. Further coordination with Zn2+ ions allowed for layer-by-layer formation of supramolecular assemblies of perylene imides on the solid substrates. With properly selected anchor and linker molecules it was possible to build high quality structures of greater than ten successive layers by a simple and straightforward procedure. The prepared films were stable and had a broad spectral coverage and high absorbance. To demonstrate their potential use, the synthesized dyes were employed in solid-state dye-sensitized solar cells, and electron injection from the perylene antennas to titanium dioxide was observed.
1550 nm high-power tapered DBR-laser diodes
This paper reports the DBR-RWG surface grating design, the fabrication process, and the output characteristics of tapered DBR laser diodes for applications such as LIDAR and range finding that require eye-safe high-power single-mode coherent light sources. The regrowth-free AlGaInAs/InP DBR lasers exhibited a CW output power as high as 560 mW in single-mode operation at room temperature. At maximum output power the SMSR was 38 dB. By changing the length of the tapered section from 0.5 mm to 4.0 mm, the maximum CW power could be scaled from 125 mW to 560 mW at room temperature.

Antibacterial and photocatalytic activity of nanocoatings generated by Liquid Flame Spray

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Physics, Research area: Aerosol Physics, Research group: Aerosol Synthesis, Laboratory of Paper Coating and Converting, Center for Functional Materials, Abo Akademi University, Turku, Department of Medical Microbiology and Immunology, University of Turku
Authors: Haapanen, J., Kummala, R., Brobbey, K., Gunell, M., Saarinen, J. J., Eerola, E., Huovinen, P., Toivakka, M., Mäkelä, J.
Antibacterial and photocatalytic nanocoatings generated by Liquid Flame Spray

General information
State: Published
Organisations: Department of Physics, Research area: Aerosol Physics, Research group: Aerosol Synthesis, Laboratory of Paper Coating and Converting, Center for Functional Materials, Abo Akademi University, Turku, Department of Medical Microbiology and Immunology, University of Turku, Tribology Center, Danish Technological Institute, Aarhus
Publication date: 2016
Peer-reviewed: Unknown
Research output: Scientific › Paper, poster or abstract

Can mass size distribution measurements give new information on the particle production with the Liquid Flame Spray?

General information
State: Published
Organisations: Department of Physics, Research area: Aerosol Physics, Research group: Aerosol Synthesis
Authors: Harra, J., Kujanpää, S., Haapanen, J., Juuti, J., Mäkelä, J.
Publication date: 2016
Peer-reviewed: Unknown
Event: Unknown
Research output: Scientific › Paper, poster or abstract

Difference Frequency Modulation in Dual-Mode Multi-Section DFB Lasers
Dual-longitudinal-mode multi-section DFB lasers with surface gratings were fabricated at 1310 and 1550 nm. Frequency differences between 15 and 1000 GHz were achieved and were modulated by several GHz with rates up to 10 GHz.

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., Aho, A. T., Dumitrescu, M.
Number of pages: 3
Publication date: 2016

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
Dilute nitride solar cells fabricated by combined MBE-MOCVD epitaxy

General information
State: Published
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications
Publication date: 2016
Peer-reviewed: Unknown
Event: Paper presented at 12th International Conference on Concentrator Photovoltaics (CPV-12), Freiburg, Germany.
Electronic versions: CPV-12_Guina_MBE-MOCVD_update
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.

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Authors: Tukiainen, A., Aho, A., Polojarvi, V., Ahorinta, R., Guina, M.
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Scopus rating (2011): SJR 0.105 SNIP 1.56
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ASJC Scopus subject areas: Environmental Engineering, Energy(all), Physics and Astronomy(all), Materials Science(all)
DOIs: 10.13052/jge1904-4720.5348
Links: http://www.scopus.com/inward/record.uri?scp=84983050025&partnerID=8YFLogxK (Link to publication in Scopus)
Source: Scopus
Source-ID: 84983050025
Research output: Scientific - peer-review › Article
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 un-used 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 fabrica-tion process and impact on improving the conversion efficiency towards >50% efficiency are assessed.

Influence of age-precipitation of Nb-Ti stabilized FeCr alloy on the initial stages of oxide film formation at 650 °C

This study reports the preparation of advanced carbon fiber composites with a nanocomposite matrix prepared by dispersing multiwall carbon nanotubes (CNTs) in a powder type epoxy oligomer with two different processing techniques (1) master batch dilution technique and (2) direct mixing (with the help of twin-screw extruder in both cases). The master
batch technique shows a better efficiency for the dispersion of the CNTs aggregates. The rheological results demonstrate that the incorporation of the CNTs into the epoxy oligomer leads, as expected, to a marked increase in the viscosity and of the presence of a yield stress point that also depends on the processing technique adopted. Carbon fiber (CFRP) and glass fiber (GFRP) composite materials were produced by electrostatic spraying of the epoxy matrix formulations on the carbon and glass fabric, respectively, followed by calendering and mold pressing. The mechanical properties of the obtained epoxy/CNT-matrix composite materials, such as interlaminar fracture toughness, flexural strength, shear storage and loss moduli are discussed in terms of the processing techniques and fabric material. The incorporation of 1 wt% CNTs in the epoxy matrix results in a relevant increase of the fracture toughness, flexural strength and modulus of both CFRP and GFRP. POLYM. COMPOS., 2015. © 2015 Society of Plastics Engineers

**General information**

State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Materials Science, Research group: Plastics and Elastomer Technology
Authors: Vaganov, G., Yudin, V., Vuorinen, J., Molchanov, E.
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Peer-reviewed: Yes
Early online date: 1 Jan 2015

**Publication information**

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- Scopus rating (2015): SJR 0.593 SNIP 0.811 CiteScore 1.7
- Scopus rating (2014): SJR 0.624 SNIP 0.955 CiteScore 1.58
- Scopus rating (2013): SJR 0.654 SNIP 1.053 CiteScore 1.58
- Scopus rating (2012): SJR 0.684 SNIP 1.025 CiteScore 1.56
- Scopus rating (2011): SJR 0.571 SNIP 0.992 CiteScore 1.4
- Scopus rating (2010): SJR 0.541 SNIP 0.764
- Scopus rating (2009): SJR 0.626 SNIP 0.854
- Scopus rating (2008): SJR 0.554 SNIP 0.804
- Scopus rating (2007): SJR 0.827 SNIP 1.358
- Scopus rating (2006): SJR 0.708 SNIP 1.25
- Scopus rating (2005): SJR 0.518 SNIP 0.695
- Scopus rating (2004): SJR 0.578 SNIP 0.821
- Scopus rating (2003): SJR 0.85 SNIP 1.019
- Scopus rating (2002): SJR 0.931 SNIP 0.94
- Scopus rating (2001): SJR 0.709 SNIP 1.067
- Scopus rating (2000): SJR 1.153 SNIP 1.277
- Scopus rating (1999): SJR 0.743 SNIP 1
Original language: English
DOIs: 10.1002/pc.23419
Source: Bibtex
Source-ID: urn:017f4ad9eaa3a92c6d7ea3eb8ae36fa1
Research output: Scientific - peer-review › Article

**In vivo genotoxic effects of uncoated and coated CeO2 NPs administrated to mice by pharyngeal aspiration**

**General information**

State: Published
Organisations: Department of Materials Science, Research group: Materials Characterization, Työterveyslaitos, University of Zaragoza, Leitat Technologial Center
Authors: Catalan, J., Aimonen, K., Hartikainen, M., Vippola, M., Moreno, C., Cabellos, J., Janer, G., Vazquez-Campos, S., Wolff, H., Savolainen, K., Norppa, H.
Number of pages: 1
Publication date: 2016
Linear Channel Modeling and Error Analysis for Intra/Inter Cellular Ca2+ Molecular Communication

The use of intra/inter-cellular calcium ion (Ca2+) signaling for molecular communication (MC) is investigated in this paper. In particular, the elevation of the intracellular Ca2+ concentration upon the external excitation, i.e., Ca2+ wave generation, and the intercellular propagation of Ca2+ wave over consecutive cells are studied for information transmission. The main objective of this paper is to develop a linear channel model for intra/inter-cellular CA2+ MC. In this context, the end-to-end CA2+ MC system is studied under three blocks: the wave generation, the gap junctional (intercellular) propagation, and the intracellular propagation. The wave generation block captures the intracellular Ca2+ signaling pathway including the release of Ca2+ from the organelles and the buffers inside a cell, and the intake from the extracellular space. The gap junctional (intercellular) propagation block captures the Ca2+ transition through the gap junctions between the touching cells. The intracellular propagation block defines the effect of the cytoplasmic diffusion. Using the developed blocks for the different biophysical phenomena, the end-to-end channel gain and delay formulas are derived. Furthermore, the bit error probability is studied to reveal the impact of the detection threshold. This work provides the basis for the modeling, analysis and the design of Ca2+ MC systems.

Magnetic cotton yarns: optimization of magnetic properties

In this paper, we present the effect of ferrite percentage content and electric current intensity passing through the electromagnet coil on magnetic properties (saturation induction, residual induction, and coercive field) of magnetic staple yarns. Also, we present a method for obtaining magnetic yarns by direct coating with magnetic powder (barium ferrite). The aim of the study is to determine the optimal processing factors that can affect the performance of magnetic characteristics using an experimental design for second-order model. The results show that an increase in ferrite percentage content is influencing the saturation and residual induction more than an increase in applied current intensity. The increase in saturation and residual induction is due to the higher content of ferrite powder from the magnetic solution that adheres on the yarn surface. The higher is the value of coercive field, the larger is the force needed to completely
demagnetize the magnetic yarn.

**Measurement of aerosol charge distributions**

**General information**
State: Published
Ministry of Education publication type: D3 Professional conference proceedings
Organisations: Department of Physics, Research area: Aerosol Physics, Research area: Optics, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group
Authors: Järvinen, A., Heikklä, P., Keskinen, J., Yli-Ojanperä, J.
Publication date: 2016

**Host publication information**
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Links:
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
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
Keywords: Synchrotron, Steel, photoelectrochemical water splitting, Passivation, near-ambient-pressure photoelectron spectroscopy, APXPS
Links: https://www.maxlab.lu.se/node/2032 (Reports 2015 - Syncrotron Radiation)
Research output: Professional › Commissioned report

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

Planar fluidic channels on TiO2 nanoparticle coated paperboard
A new design for permanent, low-cost, and planar fluidic channels on TiO2 nanoparticle coated paperboard is demonstrated. Initially superhydrophobic TiO2 nanoparticle coatings can be converted to hydrophilic by ultraviolet (UVA) light, and fluidic channels can be generated. A simple water treatment after the UVA illumination converts the channels permanent when nanoparticles are removed from the illuminated and wetted areas as shown by water contact angle, FE-SEM, XPS, and ToF-SIMS analysis. This suggests new routes for inexpensive, easy to use point-of-care diagnostics based on planar fluidic channels.

General information
State: Published
Organisations: Department of Physics, Research area: Aerosol Physics, Research group: Aerosol Synthesis, Department of Materials Science, Research group: Paper Converting and Packaging, SP Technical Research Institute of Sweden, Laboratory of Paper Coating and Converting, Center for Functional Materials, Abo Akademi University, Turku, AGH University of Science and Technology, Academic Centre for Materials and Nanotechnology
Authors: Valtakari, D., Stepien, M., Haapanen, J., Teisala, H., Tuominen, M., Kuusipalo, J., Mäkelä, J. M., Toivakka, M., Saarinen, J. J.
Number of pages: 7
Pages: 232-238
Publication date: 2016
Peer-reviewed: Yes

Publication information
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

Teollisten nanohiukkasten ympäristöriskien arviointi
In the 21st century, increasing number of nanoscale materials such as engineered nanoparticles (ENP) are produced for various industrial applications and everyday products. However, recent studies have shown that some ENPs may cause adverse effects on human health and the environment, thus a need to assess and govern risks has arisen, to ensure development and production of low-risk products containing ENPs. In order to reliably assess the risks, analytical measurement methods are needed, along with modeling methods that take into account the processes ENPs undergo in the nature. Present risk assessment models do not sufficiently consider the processes affecting ENPs after they are released into the atmosphere.

In this Master’s thesis, how the effect of possible atmospheric processes can be considered in assessments of the environmental and health risks of ENPs is studied. A Gaussian atmospheric dispersion model is proposed to model the behavior and fate of ENPs after their release into the atmosphere. The model is developed to compute exposure estimates to be used in risk assessment. Additionally, a SimpleBox4Nano-model, found during the literature review, is recommended as an exemplary model that takes into account some of the atmospheric processes. The thesis focuses also on how the uncertainty that is present in the current models can be reduced through sensitivity analysis. A sensitivity testing was performed for the dispersion model considered in this thesis and it was found that exposure estimates change the most when model input parameters such as particle mass, particle size, atmospheric stability class, wind speed and...
size of the particle plume are varied. This kind of sensitivity testing could be a way to increase accuracy and reliability of
the current risk assessment models.

General information
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Ministry of Education publication type: G2 Master's thesis, polytechnic Master's thesis
Organisations: Physics, Research area: Aerosol Physics, Research group: The Instrumentation, Emissions, and
Atmospheric Aerosols Group
Authors: Poikkimäki, M.
Number of pages: 105
Publication date: 2016

Publication information
Publisher: Tampere University of Technology
Original language: Finnish
Links:
Research output: Scientific › Master's Thesis

The Impact of Social Behavior on the Attenuation and Delay of Bacterial Nanonetworks
Molecular communication (MC) is a new paradigm for developing communication systems that exchanges information
through the transmission and reception of molecules. One proposed model for MC is using bacteria to carry information
encoded into DNA plasmids, and this is termed bacterial nanonetworks. However, a limiting factor in the models that have
been studied so far is the environment considered only in ideal conditions with a single population. This is far from realistic
in natural environments, where bacteria co-exist in multiple populations of same and different species, resulting in a very
complex social community. This complex community has social interactions that include cooperation, cheating, as well as
competition. In this paper, the effects of these social interactions on the information delivery in bacterial nanonetworks are
studied in terms of delay, attenuation and data rate. The numerical results show that the cooperative behavior of bacteria
improves the performance of delay and attenuation leading to a higher data rate, and this performance can be degraded
once their behavior switches towards cheating. The competitive social behavior shows that the performance can degrade
delay as well as attenuation leading to slower data rates, as the population with the encoded DNA plasmids are prevented
from reaching the receiver. The analysis of social interactions between the bacteria will pave the way for efficient design of
bacterial nanonetworks enabling applications such as intra-body sensing, drug delivery, and environmental control against
pollution and biological hazards.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Electronics and Communications Engineering, Research group: Emerging Technologies for
Nano-Bio-Info-Cogno, Georgia Institute of Technology
Authors: Unluturk, B., Balasubramaniam, S., Akyildiz, I. F.
Pages: 959-969
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Scopus rating (2014): SJR 0.62 SNIP 1.246 CiteScore 2.73
Scopus rating (2013): SJR 0.384 SNIP 0.766 CiteScore 1.93
Scopus rating (2012): SJR 0.41 SNIP 1.307 CiteScore 1.97
Scopus rating (2011): SJR 0.5 SNIP 0.819 CiteScore 2.11
Scopus rating (2010): SJR 0.662 SNIP 0.861
Scopus rating (2009): SJR 0.555 SNIP 0.737
Scopus rating (2008): SJR 0.572 SNIP 0.893
Scopus rating (2007): SJR 0.853 SNIP 1.228
Scopus rating (2006): SJR 0.718 SNIP 1.007
Towards material excellence: Evaluation of Tekes' programmes on materials

General information
State: Published
Ministry of Education publication type: D4 Published development or research report or study
Organisations: Department of Materials Science, Research group: Plastics and Elastomer Technology, Virebit Oy
Authors: Timonen, J., Antikainen, M., Das, A., Sarlin, E., Vuorinen, J.
Number of pages: 61
Publication date: 2016

Publication information
Publisher: Tekes
Original language: English
Links:
http://www.tekes.fi/tekes/julkaisut1/towards-material-excellence--42016/

Research output: Professional › Commissioned report

Transformation of ALD grown TiO2 film to topographically microstructured titanium silicide for photonics applications

General information
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Ministry of Education publication type: D4 Published development or research report or study
Organisations: Optoelectronics Research Centre, Research group: Surface Science, Research group: Nanophotonics
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Place of publication: Lund
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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)

Research output: Professional › Commissioned report

Second-order nonlinear optics of metal nanostructures

General information
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Ministry of Education publication type: D3 Professional conference proceedings
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Authors: Kauranen, M.
Number of pages: 2
Pages: 38-39
Publication date: 13 Dec 2015

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Title of host publication: Photonics Middle East Conference 2015
Place of publication: Doha, Qatar
Laser sintering of copper nanoparticles on top of silicon substrates

This study examines the sintering of inkjet printed nanoparticle copper ink in a room environment using a laser as a high speed sintering method. Printed patterns were sintered with increasing laser scanning speed up to 400 mm s$^{-1}$. The resistivities of the sintered structures were measured and plotted against the scanning speeds. Increased resistivity seems to correlate with increased scanning speed. A selection of analytical methods was used to study the differences in microstructure and composition of the sintered structures. Based on the results, no discernable difference in the microstructure was noticed between the structures sintered using 20 mm s$^{-1}$ to 400 mm s$^{-1}$ scanning speeds; only the structure scanned using 5 mm s$^{-1}$ speed showed a vastly different microstructure and no resistivity was measurable on this structure. Compositional studies revealed that, apart from the structure scanned with 5 mm s$^{-1}$ speed which contained the highest oxygen, the rest of the structures showed a steady oxygen increase with increased scanning speed.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Augmented Human Activities (AHA), Department of Electronics and Communications Engineering, Research group: Laboratory for Future Electronics, Department of Materials Science, Research group: Materials Characterization
Authors: Soltani, A., Khorramdel, B., Mardoukhi, A., Mäntysalo, M.
Number of pages: 5
Publication date: 9 Dec 2015
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Article number: 035203
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Scopus rating (2015): SJR 1.18 SNIP 0.966 CiteScore 3.07
Scopus rating (2014): SJR 1.465 SNIP 1.258 CiteScore 3.09
Scopus rating (2013): SJR 1.585 SNIP 1.244 CiteScore 2.74
Scopus rating (2012): SJR 1.846 SNIP 1.306 CiteScore 3.34
Scopus rating (2011): SJR 1.892 SNIP 1.461 CiteScore 3.86
Scopus rating (2010): SJR 1.844 SNIP 1.259
Scopus rating (2009): SJR 1.819 SNIP 1.28
Scopus rating (2008): SJR 1.875 SNIP 1.333
Scopus rating (2007): SJR 1.91 SNIP 1.36
Scopus rating (2006): SJR 1.934 SNIP 1.378
Scopus rating (2005): SJR 1.925 SNIP 1.445
Scopus rating (2004): SJR 1.849 SNIP 1.477
Scopus rating (2003): SJR 1.427 SNIP 1.371
Scopus rating (2002): SJR 0.962 SNIP 0.993
Scopus rating (2001): SJR 0.901 SNIP 0.94
Scopus rating (2000): SJR 0.881 SNIP 0.891
Scopus rating (1999): SJR 1.131 SNIP 0.953
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ASJC Scopus subject areas: Electrical and Electronic Engineering
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Laser sintering of copper nanoparticles on top of silicon substrates
DOI: 10.1088/0957-4484/27/3/035203
Links:

Bibliographical note
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 SDL.

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.

General information
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Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications
Authors: Korpijärvi, V.
Number of pages: 88
Publication date: 27 Nov 2015

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

Publication series
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Publisher: Tampere University of Technology
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Electronic versions:
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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.
Binding energies of exciton complexes in transition metal dichalcogenide monolayers and effect of dielectric environment

Excitons, trions, biexcitons, and exciton-trion complexes in two-dimensional transition metal dichalcogenide sheets of MoS2, MoSe2, MoTe2, WS2, and WSe2 are studied by means of density functional theory and pathintegral Monte Carlo method in order to accurately account for the particle-particle correlations. In addition, the effect of dielectric environment on the properties of these exciton complexes is studied by modifying the effective interaction potential between particles. Calculated exciton and trion binding energies are consistent with previous experimental and computational studies, and larger systems such as biexciton and exciton-trion complex are found highly stable. Binding energies of biexcitons are similar to or higher than those of trions, but the binding energy of the trion depends significantly stronger on the dielectric environment than that of biexciton. Therefore, as a function of an increasing dielectric constant of the environment the exciton-trion complex "dissociates" to a biexciton rather than to an exciton and a trion.

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 102 to 103 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.

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Authors: Ning, T., Tan, C., Niemi, T., Kauranen, M., Genty, G.
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Scopus rating (2004): SJR 2.833 SNIP 2.499
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Scopus rating (2002): SJR 1.547 SNIP 1.673
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Scopus rating (2000): SJR 1.246 SNIP 0.714
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One-step large-scale deposition of salt-free DNA origami nanostructures
DNA origami nanostructures have tremendous potential to serve as versatile platforms in self-assembly-based nanofabrication and in highly parallel nanoscale patterning. However, uniform deposition and reliable anchoring of DNA nanostructures often requires specific conditions, such as pre-treatment of the chosen substrate or a fine-tuned salt concentration for the deposition buffer. In addition, currently available deposition techniques are suitable merely for small scales. In this article, we exploit a spray-coating technique in order to resolve the aforementioned issues in the deposition of different 2D and 3D DNA origami nanostructures. We show that purified DNA origamis can be controllably deposited on silicon and glass substrates by the proposed method. The results are verified using either atomic force microscopy or fluorescence microscopy depending on the shape of the DNA origami. DNA origamis are successfully deposited onto untreated substrates with surface coverage of about 4 objects/mm(2). Further, the DNA nanostructures maintain their
shape even if the salt residues are removed from the DNA origami fabrication buffer after the folding procedure. We believe that the presented one-step spray-coating method will find use in various fields of material sciences, especially in the development of DNA biochips and in the fabrication of metamaterials and plasmonic devices through DNA metallisation.

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Research output: Scientific - peer-review › Article

**Preparation of Supercapacitors on Flexible Substrates with Electrodeposited PEDOT/Graphene Composites**

Composite films consisting of poly(3,4-ethylenedioxythiophene) (PEDOT) and graphene oxide (GO) were electrochemically polymerized by electrooxidation of EDOT in ionic liquid (BMIMBF₄) onto flexible electrode substrates. Two polymerization approaches were compared, and the cyclic voltammetry (CV) method was found to be superior to potentiostatic polymerization for the growth of PEDOT/GO films. After deposition, incorporated GO was reduced to rGO by a rapid electrochemical method of repetitive cathodic potential cycling, without using any reducing reagents. The films were characterized in 3-electrode configuration in BMIMBF₄. Symmetric supercapacitors with aqueous electrolyte were assembled from the composite films and characterized through cyclic voltammetry and galvanostatic discharge tests. It was shown that PEDOT/rGO composites have better capacitive properties than pure PEDOT or the unreduced composite film. The cycling stability of the supercapacitors was also tested, and the results indicate that the specific capacitance still retains well over 90% of the initial value after 2000 consecutive charging/discharging cycles. The supercapacitors were demonstrated as energy storages in a room light energy harvester with a printed organic solar cell and printed electrochromic display. The results are promising for the development of energy-autonomous, low-power, and disposable electronics.

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Authors: Lehtimäki, S., Suominen, M., Damlin, P., Tuukkanen, S., Kvamström, C., Lupo, D.
Number of pages: 11
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 $M^2$ 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.
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.

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Authors: Kravets, N., Piccardi, A., Alberucci, A., Buchnev, O., Assanto, G.
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Scopus rating (2011): SJR 0.263 SNIP 0.438 CiteScore 0.53
Scopus rating (2010): SJR 0.257 SNIP 0.343
Scopus rating (2009): SJR 0.28 SNIP 0.359
Construction of an Interconnected Nanostructured Carbon Black Network: Development of Highly Stretchable and Robust Elastomeric Conductors

In the present work, a strong filler-filler network of conductive carbon black was strategically established in an elastomer matrix, which leads to a unique combination of electrical and mechanical properties. The novelty of our composites was the development of a strong percolated morphology of nanostructured conducting carbon black particles by the incorporation of relatively large nonreinforcing spherical silica particles, inside the soft elastomer matrix. This technique allowed us to fabricate solution styrene butadiene rubber (S-SBR) composites with outstanding electrical conductivity of 40 S/m, tensile strength ~10 MPa, and extensibility up to 200%. Furthermore, the electrical conductivity was strain-independent up to 50% elongation strain. The electrical conductivity was found to be unaltered after 2000 loading-unloading cycles. This is the first ever report of a robust elastomeric system with such high electrical conductivity where all the basic ingredients used were selected from well-known commercially available raw materials of rubber industry. This work directly manifests an industrially viable method for preparing high-performance elastic conductors that can be utilized in robust and flexible applications.

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Authors: Bhagavatheswaran, E. S., Parsekar, M., Das, A., Le, H. H., Wiessner, S., Stöckelhuber, K. W., Schmaucks, G., Heinrich, G.
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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
Superatom Model for Ag–S Nanocluster with Delocalized Electrons

Several Ag–S nanoclusters where the cluster core comprises mixed metal (main component) and sulfur atoms show superatomic orbitals in the conduction band edge. However, there are no superatomic states, i.e., delocalized electrons, in the valence band, and the clusters in question can be labeled as “zerovalent”. We show here an example of an Ag–S cluster which fulfills the superatom model and has delocalized electrons: The recently synthesized and characterized [Ag62S12(StBu)32]2+ cluster has four delocalized valence electrons based on a simple counting rule, and we compare it to the zerovalent cluster [Ag62S13(StBu)32]4+. Our electronic structure analysis confirms the existence of superatomic states in the valence and conduction bands, but the locations of these states do not agree completely with the conventional prediction based on the spherical Jellium model. [Ag62S12(StBu)32]2+ displays the 1S2 electronic shell closure at the Fermi energy instead of the 1S21P2 configuration as suggested by its electron count. This shift of energy levels and electron shell closing has been introduced by the core–shell structure of the cluster. Our optical absorption simulation can reproduce the features observed in the experiments, and we assign these features to the transitions involving superatomic states within the conduction band.
Coating of Silica and Titania Aerosol Nanoparticles by Silver Vapor Condensation

Silica and titania aerosol nanoparticles are coated with silver through a physical coating process. The silver is evaporated in a tubular furnace flow system and condensed on the ceramic carrier particles with diameters of approximately 100nm. The temperature gradient in the furnace system is optimized in order to avoid homogeneous nucleation of the silver. The generated ceramic-silver composite nanoparticles are characterized with aerosol measurements and analytical transmission electron microscopy. Two completely different particle morphologies are clearly observed, silver-decoration and composite doublet, with amorphous silica and crystalline rutile titania as the carrier particles, respectively. The former morphology consists of multiple silver nanodots with diameters of 1-10nm, while in the latter morphology the silver had formed a larger structure with a size comparable to that of the carrier particle. Different shapes are observed in these larger silver structures, such as triangular, rodlike, and hexagonal. Differences in the silver particle migration on the surface of the silica and titania particles is proposed to be the key factor resulting into the two distinct particle morphologies.

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A single aspiration of rod-like carbon nanotubes induces asbestos-like pulmonary inflammation mediated in part by the IL-1 receptor

Carbon nanotubes (CNT) have been eagerly studied because of their multiple applications in product development and potential risks on health. We investigated the difference of two different CNT and asbestos in inducing proinflammatory reactions in C57BL/6 mice after single pharyngeal aspiration exposure. We used long tangled and long rod-like CNT, as well as crocidolite asbestos at a dose of 10 or 40 μg/mouse. The mice were sacrificed 4 and 16h or 7, 14, and 28 days after the exposure. To find out the importance of a major inflammatory marker IL-1β in CNT-induced pulmonary inflammation, we used etanercept and anakinra as antagonists as well as Interleukin 1 (IL-1) receptor (IL-1R-/-) mice. The results showed that rod-like CNT, and asbestos in lesser extent, induced strong pulmonary neutrophilia accompanied by the proinflammatory cytokines and chemokines 16h after the exposure. Seven days after the exposure, neutrophilia had essentially disappeared but strong pulmonary eosinophilia peaked in rod-like CNT and asbestos-exposed groups. After 28 days, pulmonary granulomas, goblet cell hyperplasia, and Charcot-Leyden-like crystals containing acidophilic macrophages were observed especially in rod-like CNT-exposed mice. IL-1R-/- mice and antagonists-treated mice exhibited a significant decrease in neutrophilia and messenger ribonucleic acid (mRNA) levels of proinflammatory cytokines at 16 h. However, rodlike CNT-induced Th2-type inflammation evidenced by the expression of IL-13 and mucus production was unaffected in IL-1R-/- mice at 28 days. This study provides knowledge about the pulmonary effects induced by a single exposure to the CNT and contributes to hazard assessment of carbon nanomaterials on airway exposure.

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Scopus rating (2009): SJR 1.992 SNIP 1.57
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Scopus rating (2002): SJR 1.161 SNIP 1.278
Scopus rating (2001): SJR 1.036 SNIP 1.189
Scopus rating (2000): SJR 0.668 SNIP 0.867
Scopus rating (1999): SJR 0.429 SNIP 0.618
Original language: English
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Influence of relative humidity and physical load during storage on dustiness of inorganic nanomaterials: implications for testing and risk assessment

Dustiness testing using a down-scaled EN15051 rotating drum was used to investigate the effects of storage conditions such as relative humidity and physical loading on the dustiness of five inorganic metal oxide nanostructured powder materials. The tests consisted of measurements of gravimetric respiratory dustiness index and particle size distributions. Water uptake of the powders during 7 days of incubation was investigated as an explanatory factor of the changes. Consequences of these varying storage conditions in exposure modelling were tested using the control banding and risk management tool NanoSafer. Drastic material-specific effects on powder respirable dustiness index were observed with the change in TiO$_2$ from 30 % RH (639 mg/kg) to 50 % RH (1.5 mg/kg). All five tested materials indicate a decreasing dustiness index with relative humidity increasing from 30 to 70 % RH. Test of powder water uptake showed an apparent link with the decreasing dustiness index. Effects of powder compaction appeared more material specific with both increasing and decreasing dustiness indices observed as an effect of compaction. Tests of control banding exposure models using the measured dustiness indices in three different exposure scenarios showed that in two of the tested materials, one 20 % change in RH changed the exposure banding from the lowest level to the highest. The study shows the importance of powder storage conditions prior to tests for classification of material dustiness indices. It also highlights the importance of correct storage information and relative humidity and expansion of the dustiness test conditions specifically, when using dustiness indices as a primary parameter for source strength in exposure assessment.
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.

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Scopus rating (2012): SJR 1.294 SNIP 1.638 CiteScore 2.64
Scopus rating (2011): SJR 1.137 SNIP 1.623 CiteScore 2.63
Scopus rating (2010): SJR 1.169 SNIP 1.604
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Scopus rating (2008): SJR 1.375 SNIP 1.353
Scopus rating (2007): SJR 0.999 SNIP 0.892
Scopus rating (2006): SJR 1.044 SNIP 0.929
Scopus rating (2005): SJR 0.812 SNIP 0.737
Scopus rating (2004): SJR 1.278 SNIP 1.932
Scopus rating (2003): SJR 0.616 SNIP 0.554
Scopus rating (2002): SJR 0.666 SNIP 0.636
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Scopus rating (2000): SJR 0.457 SNIP 0.687
Scopus rating (1999): SJR 0.52 SNIP 0.349
In vitro platelet activation, aggregation and platelet-granulocyte complex formation induced by surface modified single-walled carbon nanotubes

Surface modification of single-walled carbon nanotubes (SWCNTs) such as carboxylation, amidation, hydroxylation and pegylation is used to reduce the nanotube toxicity and render them more suitable for biomedical applications than their pristine counterparts. Toxicity can be manifested in platelet activation as it has been shown for SWCNTs. However, the effect of various surface modifications on the platelet activating potential of SWCNTs has not been tested yet. In vitro platelet activation (CD62P) as well as the platelet-granulocyte complex formation (CD15/CD41 double positivity) in human whole blood were measured by flow cytometry in the presence of 0.1 mg/ml of pristine or various surface modified SWCNTs. The effect of various SWCNTs was tested by whole blood impedance aggregometry, too. All tested SWCNTs but the hydroxylated ones activate platelets and promote platelet-granulocyte complex formation in vitro. Carboxylated, pegylated and pristine SWCNTs induce whole blood aggregation as well. Although pegylation is preferred from biomedical point of view, among the samples tested by us pegylated SWCNTs induced far the most prominent activation and a well detectable aggregation of platelets in whole blood. (C) 2015 Elsevier Ltd. All rights reserved.

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Authors: Fent, J., Bihari, P., Vippola, M., Sarlin, E., Lakatos, S.
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Scopus rating (2013): SJR 0.935 SNIP 1.267 CiteScore 3.32
Scopus rating (2012): SJR 0.924 SNIP 1.162 CiteScore 3.05
Scopus rating (2011): SJR 0.838 SNIP 1.047 CiteScore 2.8
Scopus rating (2010): SJR 0.824 SNIP 1.019
Scopus rating (2009): SJR 0.776 SNIP 0.928
Scopus rating (2008): SJR 0.794 SNIP 0.924
Scopus rating (2007): SJR 0.723 SNIP 0.961
Scopus rating (2006): SJR 0.695 SNIP 1.022
Scopus rating (2005): SJR 0.638 SNIP 0.964
Scopus rating (2004): SJR 0.625 SNIP 1.058
Scopus rating (2003): SJR 0.529 SNIP 0.79
Scopus rating (2002): SJR 0.329 SNIP 0.724
Scopus rating (2001): SJR 0.333 SNIP 0.502
Scopus rating (2000): SJR 0.312 SNIP 0.531
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%.

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%.
Measuring optical anisotropy in poly(3,4-ethylene dioxythiophene): poly(styrene sulfonate) films with added graphene

Abstract
Graphene is a 2D nanomaterial having a great potential for applications in electronics and optoelectronics. Composites of graphene with conducting polymers have shown high performance in practical devices and their solution-processability enables low-cost and high-throughput mass manufacturing using printing techniques. Here we measure the effect of incorporation of graphene into poly(3,4-ethylene dioxythiophene):poly(styrene sulfonate) (PEDOT:PSS) to the optical anisotropy, absorbance and conductivity of the film. Uniaxial anisotropy in PEDOT:PSS films has been thought to be caused by the spin-coating process used in fabrication. We have characterized spray- and spin-coated films using ellipsometry and total internal reflection spectroscopy, the latter especially for films too thick and uneven for ellipsometry, and show that spray-coating, similar to inkjet printing, also produces consistently anisotropic properties even in very thick and uneven films. Possible plasmonic excitations related to graphene are not seen in the films. The optical and electrical anisotropy of graphene/PEDOT:PSS enables routes to high performance devices for electronics, photonics and optoelectronics.

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Scopus rating (2007): SJR 2.262 SNIP 1.275
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Scopus rating (2005): SJR 1.792 SNIP 1.201
Scopus rating (2004): SJR 2.943 SNIP 2.108
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Bibliographical note
Holographic entanglement entropy in 2D holographic superconductor via AdS3/CFT2

The aim of the present letter is to find the holographic entanglement entropy (HEE) in 2D holographic superconductors (HSC). Indeed, it is possible to compute the exact form of this entropy due to an advantage of approximate solutions inside normal and superconducting phases with backreactions. By making the UV and IR limits applied to the integrals, an approximate expression for HEE is obtained. In case the software cannot calculate minimal surface integrals analytically, it offers the possibility to proceed with a numerical evaluation of the corresponding terms. We'll understand how the area formula incorporates the structure of the domain wall approximation. We see that HEE changes linearly with belt angle. It's due to the extensivity of this type of entropy and the emergent of an entropic force. We find that the wider belt angle corresponds to a larger holographic surface. Another remarkable observation is that no "confinement/deconfinement" phase transition point exists in our 2D dual field theory. Furthermore, we observe that the slope of the HEE with respect to the temperature dSdT decreases, thanks to the emergence extra degree of freedom(s) in low temperature system. A first order phase transition is detected near the critical point.

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Organisations: Department of Physics, Eurasian International Center for Theoretical Physics, Centre for Optical and Electromagnetic Research, Dept. of General and Theoretical Physics, Eurasian National University, COMSATS Institute of Information Technology, State Key Lab of Modern Optical Instrumentation, Department of Optical Engineering, Zhejiang University
Authors: Momeni, D., Gholizade, H., Raza, M., Myrzakulov, R.
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Scopus rating (2008): SJR 2.826 SNIP 1.326
Scopus rating (2007): SJR 3.003 SNIP 1.505
Scopus rating (2006): SJR 3.096 SNIP 1.376
Scopus rating (2005): SJR 2.713 SNIP 1.399
Scopus rating (2004): SJR 2.592 SNIP 1.293
Scopus rating (2003): SJR 2.931 SNIP 1.229
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http://www.scopus.com/inward/record.url?scp=84934964264&partnerID=8YFLLogxK (Link to publication in Scopus)
Single-mode 1180 nm GaInNAs/GaAs DBR laser diode for frequency doubling to 590 nm: paper CB_11_4

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Research group: Nanophotonics, Research group: Semiconductor Technology and Applications
Authors: Korpijärvi, V., Viheriälä, J., Aho, A., Guina, M.
Publication date: 24 Jun 2015

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Publisher: OSA
ISBN (Print): 978-1-4673-7475-0
Keywords: DBR laser, GaInNAs
Research output: Scientific - peer-review » Conference contribution

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.

General information
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Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications
Authors: Penttinen, J., Leinonen, T., Korpijärvi, V., Kantola, E., Guina, M.
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Links: https://www.osapublishing.org/abstract.cfm?uri=cleo_europe-2015-CB_P_1&origin=search
Research output: Scientific - peer-review » Conference contribution

Passive resonance sensor based method for monitoring particle suspensions
Control of particle suspensions is needed in several modern industrial processes. A reason for the difficulty in this task has been the lack of a fast and reliable measurement. In this study, we tested the measurement of particle suspension by using a method based on a passive resonance sensor. The relative amounts of dispersing agent and aluminium oxide in the suspension were varied. The studied method yielded signals which depended on the complex permittivity of the suspension. The results indicated that we were able to measure information that can be used as feedback for the suspension preparation process. In addition, the tested instrumentation was simple and robust and thus this method may allow online measurements directly from the industrial processes.

General information
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Authors: Salpavaara, T., Järveläinen, M., Seppälä, S., Yli-Hallila, T., Verho, J., Vilkko, M., Lekkala, J., Levänen, E.
Number of pages: 7
Pages: 324-330
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Peer-reviewed: Yes
Fabrication of electrospun poly(D,L lactide-co-glycolide)80/20 scaffolds loaded with diclofenac sodium for tissue engineering Surgery

Background: Adaptation of nanotechnology into materials science has also advanced tissue engineering research. Tissues are basically composed of nanoscale structures hence making nanofibrous materials closely resemble natural fibers. Adding a drug release function to such material may further advance their use in tissue repair. Methods: In the current study, bioabsorbable poly(D,L lactide-co-glycolide)80/20 (PDLGA80/20) was dissolved in a mixture of acetone/dimethylformamide. Twenty percent of diclofenac sodium was added to the solution. Nanofibers were manufactured using electrospinning. The morphology of the obtained scaffolds was analyzed by scanning electron microscopy (SEM). The release of the diclofenac sodium was assessed by UV/Vis spectroscopy. Mouse fibroblasts (MC3T3) were seeded on the scaffolds, and the cell attachment was evaluated with fluorescent microscopy. Results: The thickness of electrospun nanomats was about 1 mm. SEM analysis showed that polymeric nanofibers containing drug particles formed very interconnected porous nanostructures. The average diameter of the nanofibers was 500 nm. Drug release was measured by means of UV/Vis spectroscopy. After a high start peak, the release rate decreased considerably during 11 days and lasted about 60 days. During the evaluation of the release kinetics, a material degradation process was observed. MC3T3 cells attached to the diclofenac sodium-loaded scaffold. Conclusions: The nanofibrous porous structure made of PDLGA polymer loaded with diclofenac sodium is feasible to develop, and it may help to improve biomaterial properties for controlled tissue repair and regeneration.
Equipment for obtaining polimeric nanofibres by electrospinning technology: II. The obtaining of polimeric nanofibers

The computerized technologies and equipment for obtaining nanofibers impose high training, a large interdisciplinary substantiation, capacity for data storage, memorizing, easy usage, selectivity, fiability, stability, reduced time for analyzing/processing of the technological parameters. That is why the computerized electrospinning equipment and technologies for obtaining nanofibers are possible candidates to carry out these requirements owing to the fact that they present both the proper selectivity/sensibility and the increased processing/determining/intervening speed by using the computerized control. This paper aims to present the operation and application of equipment for obtaining polimeric nanofibers by electrospinning technology. The designing and accomplishing of the suggested electrospinning equipment has been aimed to obtain a modular system which should allow the control of the technological parameters by means of the computer. Thus, the multitude of the parameters which influence the process of electrospinning, can be independently and automatically varied. The obtained nanofibers were studied by scanning electron microscope.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
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.

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Organisations: Department of Physics, Research area: Optics
Authors: Mäkitalo, J.
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**The Role of Groove Periodicity in the Formation of Site-Controlled Quantum Dot Chains**
Structural and optical properties of InAs quantum dot (QD) chains formed in etched GaAs grooves having different periods from 200 to 2000 nm in [010] orientation are reported. The site-controlled QDs were fabricated by molecular beam epitaxy on soft UV-nanoimprint lithography-patterned GaAs(001) surfaces. Increasing the groove periods decreases the overall QD density but increases the QD size and the linear density along the groove direction. The effect of the increased QD size with larger periods is reflected in ensemble photoluminescence measurements as redshift of the QD emission. Furthermore, we demonstrate the photoluminescence emission from single QD chains.

**General information**
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Organisations: Research group: Semiconductor Technology and Applications, Optoelectronics Research Centre, Augmented Human Activities (AHA), Frontier Photonics
Authors: Schramm, A., Hakkarainen, T. V., Tommila, J., Guina, M.
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Article number: 242
High temperature oxidation tests for the high velocity solution precursor flame sprayed manganese-cobalt oxide spinel protective coatings on SOFC interconnector steel

High velocity solution precursor flame spray process was used to deposit MnCo1.9Fe0.1O4 and Mn1.5Co1.5O4 coatings on Crofer 22 APU ferritic stainless steel samples. The solution precursors were manufactured by diluting metal nitrates into deionized water. The as-sprayed coatings were oxidized at 850 degrees C for 500 h to evaluate Cr-barrier and electrical properties.

The post-mortem studies were performed with various qualitative and quantitative elemental analysis methods and a four-point measurement was used for the area specific resistance studies. The as-sprayed coatings were formed of single crystallite nanoparticles (10-20 nm) and polycrystalline sub-micron particles (100-500 nm). The small particle and crystallite size showed strong sintering behavior during the oxidation cycle. Cr-migration was fully prevented thought the oxidized coatings. The surface topography and grain growth dominated the electrical properties during the test cycle.

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Authors: Puranen, J., Laakso, J., Honkanen, M., Heinonen, S., Kylmälahti, M., Lugowski, S., Coyle, T. W., Kesler, O., Vuoristo, P.
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Scopus rating (2009): SJR 1.333 SNIP 1.885
Spontaneous formation of nanostructures by surface spinodal decomposition in GaAs$_{1-x}$Bi$_x$ epilayers

We report on the spontaneous formation of lateral composition modulations (LCMs) in Ga(As, Bi) epilayers grown by low-temperature (<300 degrees C) molecular beam epitaxy (MBE) on GaAs(001). Both cross-section and plan-view transmission electron microscopy techniques are used to investigate the nature of the LCMs, consisting of Bi-rich cylinder-like nanostructures lying along the [001] growth direction. The observed LCMs are the consequence of a two-dimensional phase separation process occurring at the surface of the growing epilayers, and their columnar nature is consistent with a surface-directed spinodal decomposition process. Although LCMs are thermodynamically driven, we show how they can be kinetically controlled, in particular, through the As/Ga flux ratio and the substrate temperature. This is a result of LCMs developing from surface atomic diffusion processes, since the atomic dimer configurations on the surface alter adatom diffusivity. The significant role of the surface reconstructions is also discussed. (c) 2015 AIP Publishing LLC.

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Organisations: Tampere University of Technology, Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Frontier Photonics, Paul-Drude-Institut für Festkörperelektronik
Authors: Luna, E., Wu, M., Puustinen, J., Guina, M., Trampert, A.
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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
Simple metal under tensile stress: layer-dependent herringbone reconstruction of thin potassium films on graphite

While understanding the properties of materials under stress is fundamentally important, designing experiments to probe the effects of large tensile stress is difficult. Here tensile stress is created in thin films of potassium (up to 4 atomic layers) by epitaxial growth on a rigid support, graphite. We find that this "simple" metal shows a long-range, periodic "herringbone" reconstruction, observed in 2- and 3- (but not 1- and 4-) layer films by low-temperature scanning tunneling microscopy (STM). Such a pattern has never been observed in a simple metal. Density functional theory (DFT) simulations indicate that the reconstruction consists of self-aligned stripes of enhanced atom density formed to relieve the tensile strain. At the same time marked layer-dependent charging effects lead to substantial variation in the apparent STM layer heights.
Workplace performance of a loose-fitting powered air purifying respirator during nanoparticle synthesis

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$^{-3}$. The derived PPF exceeded $1.1 \times 10^6$, which is more than $40 \times 10^3$ 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.

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Organisations: Department of Physics, Research group: Aerosol Synthesis, National Research Centre for the Working Environment, Finnish Institute of Occupational Health, Helsinki University, TNO
Authors: Koivisto, Antti J., Aromaa, M., Koponen, I. K., Fransman, W., Jensen, K. A., Mäkelä, J. M., Hämeri, K. J.
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Scopus rating (2013): SJR 0.749 SNIP 1.013 CiteScore 2.54
Scopus rating (2012): SJR 0.855 SNIP 1.03 CiteScore 2.56
Scopus rating (2011): SJR 1.09 SNIP 1.44 CiteScore 3.52
Scopus rating (2010): SJR 0.966 SNIP 1.248
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Scopus rating (2004): SJR 0.805 SNIP 1.332
Scopus rating (2003): SJR 0.564 SNIP 0.87
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ASJC Scopus subject areas: Atomic and Molecular Physics, and Optics, Condensed Matter Physics, Modelling and Simulation, Chemistry(all), Materials Science(all), Bioengineering
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http://www.scopus.com/inward/record.url?scp=84927730047&partnerID=8YFLogxK (Link to publication in Scopus)

Bibliographical note
EXT="Koivisto, Antti J."
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...

Localized surface plasmon resonance in silver nanoparticles: Atomistic first-principles time-dependent density-functional theory calculations

We observe using ab initio methods that localized surface plasmon resonances in icosahedral silver nanoparticles enter the asymptotic region already between diameters of 1 and 2 nm, converging close to the classical quasistatic limit around 3.4 eV. We base the observation on time-dependent density-functional theory simulations of the icosahedral silver clusters Ag55(1.06nm), Ag147(1.60nm), Ag309(2.14nm), and Ag561(2.68 nm). The simulation method combines the adiabatic...
GLLB-SC exchange-correlation functional with real time propagation in an atomic orbital basis set using the projector-augmented wave method. The method has been implemented for the electron structure code GPAW within the scope of this work. We obtain good agreement with experimental data and modeled results, including photoemission and plasmon resonance. Moreover, we can extrapolate the ab initio results to the classical quasistatically modeled icosahedral clusters.

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Authors: Kuisma, M., Sakko, A., Rossi, T. P., Larsen, A. H., Enkovaara, J., Lehtovaara, L., Rantala, T. T.

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Scopus rating (2012): SJR 3.159 SNIP 1.397 CiteScore 3.57

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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

Scopus rating (1999): SJR 3.077 SNIP 1.588

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ASJC Scopus subject areas: Condensed Matter Physics, Electronic, Optical and Magnetic Materials

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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 1.05 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.

A Method and an Apparatus for Producing Nanocellulose

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Patent number: EP2659061
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.

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Authors: Bautista, G., Mäkitalo, J., Chen, Y., Dhaka, V., Grasso, M., Karvonen, L., Jiang, H., Huttunen, M. J., Huhtio, T., Lipsanen, H., Kauranen, M.
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Scopus rating (2013): SJR 9.085 SNIP 3.41 CiteScore 14.23
Scopus rating (2012): SJR 10.253 SNIP 3.615 CiteScore 13.78
Scopus rating (2010): SJR 9.32 SNIP 3.282
Scopus rating (2009): SJR 7.868 SNIP 2.891
Scopus rating (2008): SJR 7.649 SNIP 2.991
Scopus rating (2007): SJR 6.983 SNIP 2.954
Scopus rating (2005): SJR 6.698 SNIP 2.86
Scopus rating (2004): SJR 5.259 SNIP 2.336
Scopus rating (2003): SJR 3.419 SNIP 2.07
Scopus rating (2002): SJR 2.417 SNIP 1.726

Original language: English
ASJC Scopus subject areas: Condensed Matter Physics, Bioengineering, Chemistry(all), Materials Science(all), Mechanical Engineering
Keywords: modeling, nonlinear imaging, radial polarization, Second-harmonic generation, semiconductor
DOIs: 10.1021/nl503984b
Links:
http://www.scopus.com/inward/record.url?scp=84924595561&partnerID=8YFlOgxK (Link to publication in Scopus)

Bibliographical note
AUX=fys,"Grasso, Marco"
EXT="Dhaka, Veer"
EXT="Huttunen, Mikko J."
Source: Scopus
Method and an Apparatus for Producing Nanocellulose

Described herein is nanocellulose produced by introducing a mixture of cellulose based fiber raw material and water through a refining gap, having a width smaller than 0.1 mm. In the refining gap, the fiber raw material is subjected to processing forces varying in the direction of introducing said mixture, by means of refining zones provided in the gap one after each other in the feeding direction, whereby the refining surfaces differ in surface patterning and/or surface roughness. The mixture of fiber raw material and water is guided past the refining surfaces in the feeding direction to different locations in the refining zone by by-pass channels provided in the stator. The width of the refining gap is maintained by the combined effect of the feeding pressure of the mixture of fiber raw material and water fed into the refining gap and the axial force of the rotor.

General information
State: Published
Ministry of Education publication type: H1 Granted patent
Authors: Björkqvist, T., Gustafsson, H., Koskinen, T., Nuopponen, M., Vehniäinen, A., Gustafsson, S.
Publication date: 3 Feb 2015

Publication Information
IPC: D21B 1/12 A1
Patent number: US8945346
Priority date: 31/12/10
Original language: English
Source: espacenet
Source-ID: US2014083634
Research output: Scientific › Patent

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: Ag14S(SPh)12(PPh3)8, Ag14(SC6H3F2)12(PPh3)8, Ag70S16(SPh)34(PhCO2)4(triphos), and [Ag123S35(StBu)50]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 Ag14S(SPh)12(PPh3)8, 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
Ministry of Education publication type: A1 Journal article-refereed
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
Pages: 1583-1590
Publication date: 22 Jan 2015
Peer-reviewed: Yes

Publication information
Journal: Journal of Physical Chemistry C
Volume: 119
Issue number: 3
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
Binary TiO2/SiO2 nanoparticle coating for controlling the wetting properties of paperboard

We introduce a flame based aerosol method to fabricate thin films consisting of binary TiO2/SiO2 nanoparticles deposited directly from the flame onto the paperboard. Nanocoatings were prepared with Liquid Flame Spray (LFS) in a roll-to-roll process with the line speed of 50 m/min. Surface wetting behavior of nanocoated paperboard was studied for different Ti/Si ratios in the precursor, affecting TiO2/ SiO2 ratio in the coating. Wettability could be adjusted to practically any water contact angle between 10 and 160° by setting the Ti/Si ratio in the liquid precursor. Structure of the two component nanocoating was analysed with FE-SEM, TEM, EDS, XPS and XRD. The porous thin film coating was concluded to consist of ca. 10 nm sized mixed oxide nanoparticles with segregated TiO2 and SiO2 phases. Accumulation of carbonaceous compounds on the surface was seen to be almost linearly dependent on the Ti/Si ratio, indicating of each species being exposed in corresponding amount. However, wetting of the surface was observed to follow merely an S-shaped curve, caused by the roughness of the nanocoated surface. Reasons for the observed superhydrophobicity and superhydrophilicity of these binary nanocoatings on paperboard are discussed. (C) 2014 Elsevier B.V. All rights reserved.
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.
Décalage de la bande de transmission des fibres à bande interdite photonique remplies de liquide avec le contraste d’indice

General information
State: Published
Organisations: Department of Physics, Research area: Optics, Laboratoire Charles Fabry, Institut d’Optique, Univ Paris-Sud
Publication date: 2015

Host publication information
Title of host publication: 18e Conférence HORIZONS de l’Optique
Article number: P29

Deposition of silver nanoparticles on carbon nanotube arrays

General information
State: Published
Organisations: Department of Physics, Research area: Aerosol Physics, Department of Materials Science, Research group: Materials Characterization, Research group: Aerosol Synthesis, Swiss Federal Institute of Technology, Zurich, Switzerland
Authors: Roumeli, E., Harra, J., Juuti, P., Honkanen, M., Daraio, C., Mäkelä, J.
Publication date: 2015

Effect of Multiwalled Carbon Nanotubes on the Properties of EPDM/NBR Dissimilar Elastomer Blends

In the presence of multiwalled carbon nanotubes (MWCNT), polar nitrile-butadiene rubber (NBR) and nonpolar ethylene propylene diene rubber (EPDM) blends were prepared following a melt mixing method. For the preparation of MWCNT filled EPDM/NBR blends, two mixing methods were used: direct mixing and the masterbatch dilution method. Various physical, mechanical, and morphological properties are explored to elucidate the dispersion behavior of MWCNTs. It was concluded that the preparation method influences the dispersion of the nanotubes in different rubber phases and the properties of these blends are controlled by the degree of dispersion of the nanotubes in the two phases.
Enhanced in-line detection, cleaning and repair of nano-scale defects in thin-films used for flexible photovoltaic and food packaging applications

Enhanced in-line detection, cleaning and repair of nano-scale defects in thin-films used for flexible photovoltaic and food packaging applications
Enhanced In-line detection, cleaning and repair of nano-scale defects in thin-films used for flexible photovoltaic and food packaging applications

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.
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
ASJC Scopus subject areas: Electrical and Electronic Engineering, Electronic, Optical and Magnetic Materials, Atomic and Molecular Physics, and Optics, Statistical and Nonlinear Physics
Keywords: soliton fibre laser, semiconductor saturable absorber mirror, bound states of pulses, FIBER LASER, MODE-LOCKING, OPTICAL-FIBERS, DISPERSION, RECOVERY, GAIN, TECHNOLOGY, ABSORPTION, MIRRORS, SLOW
DOIs:
10.1070/QE2015v045n01ABEH015558
Source: WOS
Source-ID: 000349382000006
Research output: Scientific - peer-review › Article

Graphene–Rubber Nanocomposites

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Materials Science, Research group: Plastics and Elastomer Technology
Authors: Das, A., Heinrich, G.
Number of pages: 4
Pages: 894-897
Publication date: 2015

Host publication information
Title of host publication: Encyclopedia of Polymeric Nanomaterials
Place of publication: Berlin, Heidelberg
Publisher: Springer
Editors: Kobayashi, S., Müllen, K.
ISBN (Print): 978-3-642-29648-2
DOIs:
10.1007/978-3-642-36199-9_293-1
Research output: Scientific - peer-review › Chapter

Imagerie fantôme temporelle: Première démonstration expérimentale

General information
State: Published
Ministry of Education publication type: D3 Professional conference proceedings
Organisations: Research area: Optics, Department of Physics, Research group: Nonlinear Fiber Optics
Authors: Ryczkowski, P., Barbier, M., Friberg, A. T., Dudley, J. M., Genty, G.
Publication date: 2015

Host publication information
Title of host publication: 18e Conférence HORIZONS de l’Optique
Article number: P8

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

Influence of Diffusion Barriers on Thermal Ageing Behaviour of Solar Absorber Coatings on Copper
The thermal stability of magnetron sputtered and electroplated solar absorber coatings were investigated at elevated temperatures of 200-500°C. Diffusion barriers of aluminium and nickel were studied towards thermal diffusion of copper substrate atoms.
The diffusion barriers studied were experimental magnetron sputtered Al layers and an industrial electroplated Ni layer between a Cu substrate and an absorber coating. The thicknesses of Al barriers were 0.1 µm and 0.5 µm, and a Ni barrier was 3 µm thick. As absorber coatings, magnetron sputtered chromium-based coatings and industrially electroplated black chromium coatings, were studied. The sputtered absorbers were a 3-layer stack of CrOx/Cr/CrOx with layer thicknesses of 0.05/0.03/0.05 µm, respectively. The electroplated black chromium coating had a thickness of 0.2 µm. Copper was used as a substrate for all of the absorbers studied.

The degradation of the absorber surfaces and influence of diffusion barriers were analysed by optical measurements (solar absorbance with a UV/Vis/NIR spectrophotometer and thermal emittance with a FTIR spectrophotometer), microstructural analyses were performed using a field-emission scanning electron microscope (FESEM). The absorbers were aged by means of heat treatments in a circulating air furnace at 200, 300, 400 and 500°C for two hours. The experimental analyses were performed before and after the ageing studies.

The results showed that without a barrier coating copper substrate atoms can diffuse into the absorber coating and through the coating to the surface of the coating and form CuO islands on the surface. These phenomena degraded optical selectivity of the absorber surface. The diffusion can be prevented or retarded with a diffusion barrier layer between the Cu substrate and the absorber coating. The 3-µm-thick Ni barrier prevented Cu diffusion and retained optical selectivity up to 500°C for two hours and the 0.5-µm-thick Al layer up to 400°C.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Materials Science, Research group: Surface Engineering
Authors: Kotilainen, M., Vuoristo, P.
Number of pages: 11
Pages: 481-491
Publication date: 2015

Host publication information
Title of host publication: Surface Modification Technologies XXVIII : Tampere University of Technology Tampere, Finland
June 16-18, 2014
ISBN (Print): 978-81-926196-1-3
Keywords: Thermal ageing, Thin films, Absorber coating, Aluminium barrier, Copper substrate, Diffusion barrier, Magnetron sputtering, Stability
Research output: Scientific - peer-review » Conference contribution

Lasing in ultrasmall microdisc/microring cavities with active region based on InAs/InGaAs/GaAs quantum dots

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Optoelectronics Research Centre, Univ Eastern Finland, University of Eastern Finland, Inst Photon, St. Petersburg Academic University
Authors: Karpov, D., Laukkanen, J., Tommila, J., Svirko, Y., Kryzhanovskaya, N., Zhukov, A., Lipovskii, A.
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
Research output: Scientific » Conference contribution

Layered Double Hydroxide (LDH)-Based Rubber Nanocomposites

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Materials Science, Research group: Plastics and Elastomer Technology
Authors: Basu, D., Das, A., Heinrich, G.
Number of pages: 6
Pages: 1050-1055
Publication date: 2015
Local cleaning method for micron-sized particle contamination in thin film processing

General information
State: Published
Organisations: Department of Materials Science, Research group: Paper Converting and Packaging
Authors: Lahti, J.
Publication date: 2015

Publication information
Year: 2015
Original language: English
Links:
http://nanomend.eu/

Bibliographical note
Public flyer published by EU project NanoMend
Research output: Scientific › Other contribution

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
Micro- and nano-scale defect detection, cleaning and repair techniques to improve the quality of nanoscale barrier coatings

Microdisk lasers based on GaInNAsSb/GaAsN quantum well active region

Microdisk lasers based on GaInNAsSb/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.

Non-Instantaneous Polarization Dynamics in Resonant Dielectrics

Nanoscale surface modification and barrier coatings for packaging materials
Nonlinear Optics of 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., Koskinen, K., Lehtolahti, J., Laukkanen, J., Kuittinen, 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
Research output: Scientific - peer-review - Conference contribution

Optical properties and thermionic emission in solar cells with InAs quantum dots embedded within GaNAs and GaInNAs

The optical properties of p-i-n solar cells comprised of InAs quantum dots embedded within GaNAs and GaInNAs quantum wells are reported. Strain compensating and mediating GaNAs and GaInNAs layers shift the photoluminescence emission as well as absorption edge of the quantum dots to longer wavelengths. GaNAs and GaInNAs quantum wells contribute also to extending the absorption edge. In addition, the use of GaNAs and GaInNAs layers enhances the thermal escape of electrons from QDs by introducing steps for electrons to the GaAs conduction band.

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, Faculty of Exact Sciences and Engineering, Hyperion University
Authors: Polojärvi, V., Pavelescu, E., Schramm, A., Tukiainen, A., Aho, A., Puustinen, J., Guina, M.
Number of pages: 4
Pages: 122-125
Publication date: 2015
Peer-reviewed: Yes
Early online date: 19 Jun 2015

Publication information
Journal: Scripta Materialia
Volume: 108
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
Pigment-cellulose nanofibril composite and its application as a separator-substrate in printed supercapacitors

Pigment-cellulose nanofibril (PCN) composites were manufactured in a pilot line and used as a separator-substrate in printed graphene and carbon nanotube supercapacitors. The composites consisted typically of 80% pigment and 20% cellulose nanofibrils (CNF). This composition makes them a cost-effective alternative as a substrate for printed electronics at high temperatures that only very special plastic films can nowadays stand. The properties of these substrates can be varied within a relatively large range by the selection of raw materials and their relative proportions. A semi-industrial scale pilot line was successfully used to produce smooth, flexible, and nanoporous composites, and their performance was tested in a double functional separator-substrate element in supercapacitors. The nanostructural carbon films printed on the composite worked simultaneously as high surface area active electrodes and current collectors. Low-cost supercapacitors made from environmentally friendly materials have significant potential for use in flexible, wearable, and disposable low-end products.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Electronics and Communications Engineering, Research group: Laboratory for Future Electronics, Department of Automation Science and Engineering, Augmented Human Activities (AHA), VTT
Authors: Torvinen, K., Lehtimäki, S., Keränen, J. T., Sievänen, J., Vartiainen, J., Hellén, E., Lupo, D., Tuukkanen, S.
Number of pages: 8
Pages: 1040-1047
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: Electronic Materials Letters
Volume: 11
Issue number: 6
ISSN (Print): 1738-8090
Ratings:
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: BELLENGHAM
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), SUPERCONTINUUM GENERATION, OUTPUT POWER, PICOSECOND, VECSEL, PULSES, GHZ
DOIs: 10.1117/12.2076805
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 AlGaNAs/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.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Roll-to-roll coating by liquid flame spray nanoparticle deposition

Nanostructured coatings have been prepared on a flexible, moving paperboard using deposition of ca. 10-50-nm-sized titanium dioxide and silicon dioxide nanoparticles generated by a liquid flame spray process, directly above the paperboard, to achieve improved functional properties for the material. With moderately high production rate (~ g/min), the method is applicable for thin aerosol coating of large area surfaces. LFS-made nanocoating can be synthesized e.g. on paper, board or polymer film in roll-to-roll process. The degree of particle agglomeration is governed by both physicochemical properties of the particle material and residence time in aerosol phase prior to deposition. By adjusting the speed of the substrate, even heat sensitive materials can be coated. In this study, nanoparticles were deposited directly on a moving paperboard with line speeds 50-300 m/min. Functional properties of the nanocoating can be varied by changing nanoparticle material; e.g. TiO2 and SiO2 are used for changing the surface wetting properties. If the liquid precursors are dissolved in one solution, synthesis of multi component nanoparticle coatings is possible in a one phase process. Here, we present analysis of the properties of LFS-fabricated nanocoatings on paperboard. The thermophoretic flux of nanoparticles is estimated to be very high from the hot flame onto the cold substrate. A highly hydrophobic coating was obtained by a mass loading in the order of 50-100 mg/m2 of titanium dioxide on the paperboard.
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.

Tellurium (Te)-doping of self-catalyzed GaAs nanowires

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 with the {111}-facetted sidewalls. Finally, the incorporation of Te is confirmed by Raman spectroscopy.
The effect of coupling agents on silicate-based nanofillers/carbon black dual filler systems on the properties of a natural rubber/butadiene rubber compound

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Materials Science, Engineering materials science and solutions (EMASS)
Authors: Poikelispää, M., Das, A., Dierkes, W., Vuorinen, J.
Number of pages: 15
Pages: 738-752
Publication date: 2015
Peer-reviewed: Yes
Early online date: 1 Jan 2014

Publication information
Journal: Journal of Elastomers and Plastics
Volume: 47
Issue number: 8
ISSN (Print): 0095-2443
Ratings:
Scopus rating (2016): SJR 0.278 SNIP 0.533 CiteScore 0.76
Scopus rating (2015): SJR 0.243 SNIP 0.481 CiteScore 0.61
Scopus rating (2014): SJR 0.208 SNIP 0.471 CiteScore 0.6
Thermal Management in Long-Wavelength Flip-Chip Semiconductor Disk Lasers

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

Publication information
Journal: IEEE Journal of Selected Topics in Quantum Electronics
Volume: 21
Issue number: 6
Article number: 1501507
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
DOIs:
10.1109/JSTQE.2015.2420599

Bibliographical note
ORG=orc,0.5
ORG=elt,0.5
Research output: Scientific - peer-review › Article

Titania–silver composite nanoparticles with interesting morphology

General information
State: Published
Ministry of Education publication type: D3 Professional conference proceedings
Organisations: Department of Physics, Research area: Aerosol Physics, Research group: Aerosol Synthesis
Authors: Harra, J., Juuti, P., Haapanen, J., Sorvali, M., Mäkelä, J.
Publication date: 2015

Host publication information
Title of host publication: AT 2015, Aerosol Technology: June 15-17, 2015, Tampere, Finland

Bibliographical note
AT2015 ei ISBN:ää / HO
Research output: Professional › Conference contribution

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
DOIs:
10.1117/12.2076795
Research output: Scientific - peer-review › Conference contribution

Tunable second-harmonic generation in a single nanostructure

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: Turquet, L., Bautista, G., Kakko, J., Karvonen, L., Dhaka, V., Chen, Y., Jiang, H., Huhtio, T., Lipsanen, H., Kauranen, M.
Number of pages: 2
Publication date: 2015

Host publication information
Title of host publication: The Eleventh Finland-Japan Joint Symposium on Optics in Engineering
Links:
Ultra barrier protection for paper packaging using atomic layer deposition

General information
State: Published
Organisations: Department of Materials Science, Research group: Paper Converting and Packaging
Authors: Lahti, J.
Publication date: 2015

Publication information
Year: 2015
Original language: English
Links:
http://nanomend.eu/

Bibliographical note
Public flyer published by EU project NanoMend
Research output: Scientific › Other contribution

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 if it is sufficiently close.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research area: Computational Physics, Department of Chemistry and Bioengineering, Research group: Supramolecular photochemistry, Computational Science X (CompX), Frontier Photonics, VTT Technical Research Centre of Finland
Authors: Karilainen, T., Cramariuc, O., Kuisma, M., Tappura, K., Hukka, T. I.
Number of pages: 10
Pages: 612-621
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: Journal of Computational Chemistry
Volume: 36
Issue number: 9
ISSN (Print): 0192-8651
Ratings:
Scopus rating (2016): SJR 1.428 SNIP 1.297 CiteScore 3.51
Scopus rating (2015): SJR 1.417 SNIP 1.451 CiteScore 3.81
Scopus rating (2014): SJR 1.489 SNIP 1.451 CiteScore 3.78
Scopus rating (2013): SJR 1.449 SNIP 1.516 CiteScore 4.15
Scopus rating (2012): SJR 1.874 SNIP 1.64 CiteScore 4.43
Scopus rating (2011): SJR 1.834 SNIP 1.611 CiteScore 4.47
Scopus rating (2010): SJR 1.745 SNIP 1.366
Mode-locked 1.33 μm semiconductor disk laser with a bismuth-doped fiber amplifier

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: Semiconductor Technology and Applications, Frontier Photonics, Fiber Optics Research Center, Russian Academy of Sciences
Number of pages: 2
Pages: 123-124
Publication date: 16 Dec 2014

Host publication information
Title of host publication: ISLC 2014, IEEE 24th International Semiconductor Laser Conference, 7-10 September, 2014, Mallorca, Spain
Publisher: The Institute of Electrical and Electronics Engineers, Inc.
Article number: 6987481
ISBN (Print): 9781479957217

Publication series
Name: IEEE International Semiconductor Laser Conference
ASJC Scopus subject areas: Electrical and Electronic Engineering, Atomic and Molecular Physics, and Optics
DOIs:
10.1109/ISLC.2014.194
Links:
http://www.scopus.com/inward/record.url?scp=84920126178&partnerID=8YFLogxK (Link to publication in Scopus)
Nanofabrication and Adsorption Studies of Organic Molecules on Metal and Metal Alloy Surfaces as Templates for Biofunctional Applications

The nanofabrication of organic layers on metal and metal alloy surfaces was studied in this thesis by employing photoelectron spectroscopy (PES) as the main analysis method. The motivation for this research is to introduce new properties to metal and metal alloy surfaces via self-assembly driven adsorption processes of organic molecules. Trimesic acid (TMA) and glycine adsorption on single crystal Cu(100) surface was investigated with PES and scanning tunnelling microscopy (STM). TMA on Cu(100) exhibits coverage dependent surface phases with drastic changes in the molecular orientation. The mobile TMA molecules at low coverage transform into Cu atom coordinated TMA networks and finally into carboxyl (COOH) functionalized, densely packed TMA monolayers. This is enabled due to three equivalent COOH groups symmetrically around a rigid benzene ring. Homo- and heterochiral surface phases of achiral glycine on Cu(100) were observed, and a new structural model for glycine bonding on Cu(100) based on STM and density functional theory calculations is presented. The coadsorption of aminopropyl trimethoxysilane (APS) and mercaptopropyl trimethoxysilane (MPS) on stainless steel was studied with an aim to incorporate MPS in APS matrix with tuneable distribution. In addition to the determination of elemental and chemical states at the surface, PES data was also used to determine the surface morphology by employing inelastic electron energy-loss background analysis. Synchrotron radiation mediated PES enabled the study of the in-depth distribution of the chemical states in non-destructive manner. The functionality of the APS/MPS overlayers on stainless steel was studied with chemical derivatization. The studies of TMA and glycine on Cu(100) provide important knowledge of the adsorption behaviour of small molecules on surfaces, which is crucial for understanding the adsorption phenomena of larger molecules, such as proteins on more complex substrates. The fabricated surface structures may also be applicable to molecular electronics or catalytic surfaces. The bifunctional silanization of stainless steel, on the other hand, is directly transferrable to industrial scale processes. The bifunctional APS/MPS nanomolecular layer on stainless steel works as a template, to which biomolecules can be covalently coupled with tuneable distribution. Hence, the stainless steel surface can be biofunctionalized for a range of applications, depending on the properties of the biomolecules.

Nonlinear optical response of metal nanoparticles and nanocomposites

In this work, we study the second-order nonlinear optical properties of two kinds of nanoplasmic structures. The first part of the study concerns regular arrays of L-shaped gold nanoparticles. The samples are investigated by linear characterization, i.e., extinction spectroscopy, and by second-harmonic generation. By incorporating the effective medium theory into the earlier developed nonlinear response tensor formalism, we determine the effects connected to higher-multipolar interactions in the second-order nonlinear response of the samples. We verify the effect of the sample quality on the presence of such multipolar contributions, as well as the effect of the local field enhancement, which is driven by the plasmon resonance. In the second part of the thesis, we investigate bulk-like materials with symmetry breaking along the direction of the normal to the sample surface. These samples are fabricated with aerosol techniques, which are relatively cheap and time efficient. The symmetry breaking is induced by the structure, i.e. by separating consecutive layers of
silver-glass nanocomposite with silica glass. It is shown that after optimization such a structure might be interesting as a second-order nonlinear material. We also develop an analytical model that allows us to estimate the surface nonlinear tensor of such structures. Preliminary estimates show that decreasing the effective thickness of such structures could improve their nonlinear properties.

General information
State: Published
Ministry of Education publication type: G5 Doctoral dissertation (article)
Organisations: Research group: Nonlinear Optics, Research area: Optics, Department of Physics
Authors: Zdanowicz, M.
Number of pages: 72
Publication date: 12 Sep 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: 1241
ISSN (Print): 1459-2045
Electronic versions:
zdanowicz.pdf
errata.pdf
Links:

Bibliographical note
Awarding institution:Tampere University of Technology
Source: researchoutputwizard
Source-ID: 1836
Research output: Collection of articles › Doctoral Thesis

Three-dimensional winged nanocone optical antennas

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: Huttunen, M., Lindfors, K., Andriano, D., Mäkitalo, J., Bautista, G., Lippiz, M., Kauranen, M.
Number of pages: 4
Pages: 3683-3689
Publication date: 13 Jun 2014
Peer-reviewed: Yes

Publication information
Journal: Optics Letters
Volume: 39
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
Switchable water absorption of paper via liquid flame spray nanoparticle coating

Surface wetting/anti-wetting and liquid absorption are relevant properties of many porous solids including paper and other cellulose-based materials. Here we demonstrate how surface wetting by water and water absorption of commercially available Kraft paper can be altered by thin nanoparticle coatings fabricated by liquid flame spray in facile and continuous one-step process. Surface wettability and absorption properties of paper increased with silica and decreased with titania (TiO₂) nanoparticle coatings. Moreover, the water-repellent (superhydrophobic) TiO₂ nanoparticle coated paper could be switched to superhydrophilic and water absorbing by ultraviolet illumination. The experiments revealed that although surface wetting and liquid absorption of nanoparticle coated paper are strongly related to each other, they are two distinct phenomena which do not necessarily correlate. We propose wetting regimes on the nanoparticle coated paper samples on the basis of the experimental observations.
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 Society of America
Composition dependent growth dynamics in molecular beam epitaxy of GaInNAs solar cells

We have investigated the role of the nitrogen content, the growth parameters, and the annealing processes involved in molecular beam epitaxy of GaInNAs solar cells lattice-matched to GaAs. The nitrogen composition was varied between 1% and 5%. The influence of the growth temperature was assessed by performing photoluminescence, atomic force microscopy, X-ray diffraction, reflection high-energy electron diffraction, quantum efficiency and light-biased current-voltage measurements. The growth temperature ensuring the best cell parameters was found to be 440 °C. At this temperature we were able to incorporate up to 4% of nitrogen and achieve a good material quality. Further increase of the N composition to 5% led to phase separation. For the lattice matched samples grown within the optimal temperature range, we have identified a clear (1×3) surface reconstruction. Using the optimized growth we have demonstrated a GaInNAs p-i-n solar cell structure containing 4% nitrogen, that exhibited a short-circuit current density as high as 33.8 mA/cm² in respect to effective area illuminated. These measurements have been performed under real sun AM1.5 (~1000 W/m²) illumination. © 2014 Elsevier B.V.
Site-Controlled Epitaxy and Fundamental Properties of InAs Quantum Dot Chains

Self-assembled InAs/GaAs quantum dots (QD) are artificial atoms which exhibit extremely high optical and structural quality and enable tailoring of the quantum confinement by adjusting their size, shape, and chemical composition. However, a disadvantage of the self-assembled formation process is that the QDs are randomly located on the GaAs surface. The ability to determine the positions of the QDs at the moment of nucleation, i.e. site-controlled growth, is essential for the new generation of photonic applications including single- and entangled-photon sources and nanophotonic integrated circuits. The purpose of this thesis is to introduce a new nanomaterial system composed of site-controlled InAs quantum dot chains (QDC) grown by molecular beam epitaxy in nanoimprint lithography prepared grooves. A thorough investigation of the structural and optical properties of QDCs is also presented. The thesis demonstrates that, regardless of the inherent anisotropy of the GaAs(100) surface, QDCs having similar density, size, and emission energy can be grown simultaneously on nanopatterns with different orientations by carefully selecting the growth parameters. However, the in-plane optical polarization of the spontaneous emission from the QDCs depends on their orientation. In more general perspective, this thesis reveals that the nanopattern on which the site-controlled QDs are grown has a strong influence on their morphological properties, including shape, size, strain profile, and composition profile. These properties are strongly cross-correlated and they all influence the electronic and optical characteristics of the QDs. For example, the growth of QDs in the grooves increases their oscillator strength for the vertically polarized spontaneous emission, which is the polarization component that can be coupled to surface plasmons in a metal film. This polarization property accompanied by the possibility of deterministic lateral positioning makes the site-controlled QDCs potential building blocks for plasmonic and nanophotonic waveguides.
1.33 um MOPA system based on ultrafast semiconductor disk laser and bismuth fiber amplifier

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Optoelectronics Research Centre
Authors: Heikkinen, J., Gumenyuk, R., Rantamäki, A., Leinonen, T., Melkumov, M., Dianov, E. M., Okhotnikov, O. G.
Number of pages: 1
Pages: 32-32
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
Oral, Session 6.Ultrafast optics and microscopy<br/>Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND:
2014-10-24<br/>Publisher name: Finnish Optical Society
Source: researchoutputwizard
Source-ID: 430
Research output: Scientific › Conference contribution

Abrasion and compression resistance of liquid-flame-spray-deposited functional nanoparticle coatings on paper

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Materials Science, Research group: Paper Converting and Packaging, Department of Physics, Research area: Aerosol Physics, Research group: Aerosol Synthesis, Engineering materials science and solutions (EMASS), Abo Akad Univ, Abo Akademi University, Dept Phys, Paper and Fibre Research Institute (PFI), SP Technical Research Institute of Sweden
Authors: Stepień, M., Chinga-Carrasco, G., Saarinen, J. J., Teisala, H., Tuominen, M., Haapanen, J., Kuusipalo, J., Mäkelä, J. M., Toivakka, M.
Number of pages: 15
Pages: 68-82
Publication date: 2014

Host publication information
Title of host publication: 13th TAPPI Advanced Coating Fundamentals Symposium 2014
Publisher: TAPPI Press
ISBN (Print): 9781510801295
ASJC Scopus subject areas: Materials Chemistry, Electrical and Electronic Engineering
Links:
http://www.scopus.com/inward/record.url?scp=84942588921&partnerID=8YFLogxK (Link to publication in Scopus)

Bibliographical note
ORG=mol,0.5
ORG=fys,0.5
Source: Scopus
Source-ID: 84942588921
Research output: Scientific - peer-review › Conference contribution
Abstracts of the 28th International Conference on Surface Modification Technologies, SMT28, Tampere University of Technology, Tampere, Finland, June 16-18, 2014

General information
State: Published
Ministry of Education publication type: C2 Edited books
Organisations: Department of Materials Science
Number of pages: 150
Publication date: 2014

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

Bibliographical note
Contribution: organisation=mol,FACT1=1<br/>Portfolio EDEND: 2014-11-28
Source: researchoutputwizard
Source-ID: 1780
Research output: Scientific - peer-review › Anthology

Adjustable wetting of Liquid Flame Spray (LFS) TiO2-nanoparticle coated board: Batch-type versus roll-to-roll Stimulation methods

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Materials Science, Department of Physics, Engineering materials science and solutions (EMASS)
Authors: Tuominen, M., Teisala, H., Haapanen, J., Aromaa, M., Mäkelä, J. M., Stepien, M., Saarinen, J. J., Toivakka, M., Kuusipalo, J.
Number of pages: 9
Pages: 271-279
Publication date: 2014
Peer-reviewed: Yes

Publication information
Volume: 29
Issue number: 2
ISSN (Print): 0283-2631
Ratings:
Scopus rating (2016): CiteScore 1.2 SJR 0.385 SNIP 0.652
Scopus rating (2015): SJR 0.375 SNIP 0.787 CiteScore 0.91
Scopus rating (2014): SJR 0.444 SNIP 0.823 CiteScore 0.99
Scopus rating (2013): SJR 0.389 SNIP 0.684 CiteScore 0.71
Scopus rating (2012): SJR 0.628 SNIP 1.281 CiteScore 1.13
Scopus rating (2011): SJR 0.582 SNIP 0.902 CiteScore 0.78
Scopus rating (2010): SJR 0.658 SNIP 0.764
Scopus rating (2009): SJR 1.167 SNIP 0.984
Scopus rating (2008): SJR 0.928 SNIP 0.857
Scopus rating (2007): SJR 2.018 SNIP 1.035
Scopus rating (2006): SJR 1.002 SNIP 0.951
Scopus rating (2005): SJR 1.181 SNIP 0.997
Scopus rating (2004): SJR 2.08 SNIP 1.354
Scopus rating (2003): SJR 2.952 SNIP 1.129
Scopus rating (2002): SJR 1.836 SNIP 1.145
Scopus rating (2001): SJR 1.12 SNIP 1.147
Scopus rating (2000): SJR 1.086 SNIP 1.154
Aerosol fabrication of multilayer nanocomposites for nonlinear optics

General information
State: Published
Ministry of Education publication type: D3 Professional conference proceedings
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

Bibliographical note
Kysytty ISBN tai ISSN-numeroa, ei löydy

Aerosol fabrication of silver–silica nanocomposites for linear and nonlinear optics

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Publication date: 2014

Host publication information
Title of host publication: NOSA 2014, Nordic Aerosol Symposium, January 30-31, 2014, Stockholm, Sweden
Publisher: Nordic Society for Aerosol Research

Bibliographical note
ISBN kysytty, HO.
xabstract
Research output: Scientific › Conference contribution

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,
Applications of supercritical carbon dioxide in materials processing and synthesis

General information
State: Published
Ministry of Education publication type: A2 Review article in a scientific journal
Organisations: Department of Materials Science, Engineering materials science and solutions (EMASS)
Authors: Zhang, X., Heinonen, S., Lévänen, E.
Number of pages: 17
Pages: 1-16
Publication date: 2014
Peer-reviewed: Yes

Publication Information
Journal: RSC Advances
Issue number: xx
ISSN (Print): 2046-2069
Ratings:
Scopus rating (2016): CiteScore 3.06 SJR 0.875 SNIP 0.743
Scopus rating (2015): SJR 0.959 SNIP 0.837 CiteScore 3.42
Scopus rating (2014): SJR 1.114 SNIP 0.965 CiteScore 3.87
Scopus rating (2013): SJR 1.117 SNIP 0.903 CiteScore 3.74
Scopus rating (2012): SJR 0.863 SNIP 0.603 CiteScore 2.4
Original language: English
DOIs: 10.1039/C4RA10662H

Bibliographical note
Contribution: organisation=mol,FACT1=1<br/>
Portfolio EDEND: 2014-11-27<br/>
Publisher name: The Royal Society of Chemistry
Source: researchoutputwizard
Source-ID: 1845
Research output: Scientific - peer-review › Review Article

Approaches to Light-Matter Interaction and Surface Phenomena within Density Functional Theory

General information
State: Published
Ministry of Education publication type: G4 Doctoral dissertation (monograph)
Organisations: Research area: Computational Physics, Research group: Electronic Structure Theory, Department of Physics
Authors: Kuisma, M.
Number of pages: 153
Publication date: 2014

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

Publication series
A secretomics analysis reveals major differences in the macrophage responses towards different types of carbon nanotubes

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Materials Science, Engineering materials science and solutions (EMASS)
Authors: Palomäki, J., Sund, J., Vippola, M., Kinaret, P., Greco, D., Savolainen, K., Puustinen, A., Alenius, H.
Number of pages: 10
Pages: 1-10
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Nanotoxicology
ISSN (Print): 1743-5390
Ratings:
Scopus rating (2016): SJR 1.594 SNIP 1.251 CiteScore 5.8
Scopus rating (2015): SJR 2.106 SNIP 1.551 CiteScore 7.14
Scopus rating (2014): SJR 1.711 SNIP 1.311 CiteScore 5.92
Scopus rating (2013): SJR 2.009 SNIP 1.433 CiteScore 6.39
Scopus rating (2012): SJR 2.106 SNIP 1.378 CiteScore 6.49
Scopus rating (2011): SJR 1.584 SNIP 1.097 CiteScore 4.77
Scopus rating (2010): SJR 1.404 SNIP 1.244
Scopus rating (2009): SJR 1.501 SNIP 1.436
Scopus rating (2008): SJR 1.039 SNIP 0.887
Original language: English
DOIs:
10.3109/17435390.2014.969346

Bibliographical note
Contribution: organisation=mol,FACT1=1<br/>Portfolio EDEND: 2014-10-30<br/>Publisher name: Informa Healthcare
Source: researchoutputwizard
Source-ID: 1220
Research output: Scientific - peer-review › Article

Biofunctional hybrid materials: bimolecular organosilane monolayers on FeCr alloys

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Surface Science, Frontier Photonics, Multi-scaled biodata analysis and modelling (MultiBAM)
Authors: Vuori, L., Leppiniemi, J., Hannula, M., Lahtonen, K., Hirsimäki, M., Nömmiste, E., Costelle, L., Hytönen, V. P., Vaiden, M.
Number of pages: 10
Pages: 1-10
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Nanotechnology
Bioresintry products. Initial process piloting and material prototype production in the case of barriers, 3D-mouldable packaging and filters

General information
State: Published
Ministry of Education publication type: D4 Published development or research report or study
Organisations: Department of Materials Science
Number of pages: 17
Publication date: 2014

Publication information
Publisher: Finnish Bioeconomy Cluster FIBIC
ISBN (Print): 978-952-67969-6-3
ISBN (Electronic): 978-952-67969-7-0
Original language: English

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2014-10-17<br/>Publisher name: Institute of Physics
Source: researchoutputwizard
Source-ID: 1773
Research output: Scientific - peer-review › Article

Bipolar Charge Analyzer (BOLAR): A new aerosol instrument for bipolar charge measurements

Bibliographical note
Contribution: organisation=mol,FACT1=1<br/>Portfolio EDEND: 2015-01-08
Source: researchoutputwizard
Source-ID: 40
Research output: Professional › Commissioned report
Carbon-based nanomaterials accelerate arteriolar thrombus formation in the murine microcirculation independently of their shape

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Aerosol Physics, Department of Physics, Urban circular bioeconomy (UrCirBio)
Authors: Yli-Ojanperä, J., Ukkonen, A., Järvinen, A., Layzell, S., Niemelä, V., Keskinen, J.
Number of pages: 15
Pages: 16-30
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Journal of Aerosol Science
Volume: 77
ISSN (Print): 0021-8502
Ratings:
Scopus rating (2016): CiteScore 2.21 SJR 0.843 SNIP 1.199
Scopus rating (2015): SJR 1.072 SNIP 1.318 CiteScore 2.47
Scopus rating (2014): SJR 1.068 SNIP 1.586 CiteScore 2.72
Scopus rating (2013): SJR 1.187 SNIP 1.858 CiteScore 2.9
Scopus rating (2012): SJR 1.294 SNIP 1.638 CiteScore 2.64
Scopus rating (2011): SJR 1.137 SNIP 1.623 CiteScore 2.63
Scopus rating (2010): SJR 1.169 SNIP 1.604
Scopus rating (2009): SJR 1.457 SNIP 1.782
Scopus rating (2008): SJR 1.375 SNIP 1.353
Scopus rating (2007): SJR 0.999 SNIP 0.892
Scopus rating (2006): SJR 1.044 SNIP 0.929
Scopus rating (2005): SJR 0.812 SNIP 0.737
Scopus rating (2004): SJR 1.278 SNIP 1.932
Scopus rating (2003): SJR 0.616 SNIP 0.554
Scopus rating (2002): SJR 0.666 SNIP 0.636
Scopus rating (2001): SJR 0.455 SNIP 0.419
Scopus rating (2000): SJR 0.457 SNIP 0.687
Scopus rating (1999): SJR 0.52 SNIP 0.349
Original language: English
DOIs:
10.1016/j.jaerosci.2014.07.004

Bibliographical note
Contribution: organisation=fys,FACy1=1<br/>Portfolio EDEND: 2014-09-30<br/>Publisher name: Pergamon; Elsevier; Gesellschaft fuer Aerosolforschung
Source: researchoutputwizard
Source-ID: 1822
Research output: Scientific - peer-review › Article

Carbon-based nanomaterials accelerate arteriolar thrombus formation in the murine microcirculation independently of their shape

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Materials Science, Engineering materials science and solutions (EMASS)
Authors: Holzer, M., Bihari, P., Praetner, M., Uhl, B., Reichel, C., Fent, J., Vippola, M., Lakatos, S., Krombach, F.
Number of pages: 10
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Journal of Applied Toxicology
ISSN (Print): 0260-437X
Ratings:
Scopus rating (2016): SJR 0.897 SNIP 0.95 CiteScore 3.04
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)
Authors: Vilhena, J. G., Räsänen, E., Marques, M. A. L., Pittalis, S.
Number of pages: 6
Pages: 1837-1842
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Journal of Chemical Theory and Computation
Volume: 10
Issue number: 5
ISSN (Print): 1549-9618
Ratings:
Scopus rating (2016): SJR 2.801 SNIP 1.589 CiteScore 5.37
Scopus rating (2015): SJR 2.795 SNIP 1.748 CiteScore 5.65
Scopus rating (2014): SJR 2.777 SNIP 1.603 CiteScore 5.63
Scopus rating (2013): SJR 2.409 SNIP 1.578 CiteScore 5.41
Scopus rating (2012): SJR 2.744 SNIP 1.608 CiteScore 5.34
Scopus rating (2011): SJR 2.742 SNIP 1.815 CiteScore 5.82
Scopus rating (2010): SJR 2.372 SNIP 1.46
Scopus rating (2009): SJR 2.616 SNIP 1.273
Scopus rating (2008): SJR 2.367 SNIP 1.173
Scopus rating (2007): SJR 2.3 SNIP 1.401
Scopus rating (2006): SJR 1.77 SNIP 1.062
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
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

**Dilute Nitride Space Solar Cells: Towards 4 Junctions**

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

**Host publication information**
Title of host publication: 10th European Space Power Conference ESPC 2014, 13-17 April, 2014, Noordwijkerhout, the Netherlands
Publisher: European Space Agency
ISBN (Print): 978-92-9221-283-4

**Publication series**
Name: European Space Agency - Special Publication (ESA - SP)
Volume: 719
ISSN (Print): 1609-042X
Effect of plasma treated Ag/indium tin oxide anode modification on stability of polymer solar cells

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Surface Science, Frontier Photonics
Authors: Augustine, B., Sliz, R., Lahtonen, K., Valden, M., Myllylä, R., Fabritius, T.
Number of pages: 5
Pages: 330-334
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Solar Energy Materials and Solar Cells
Volume: 128
ISSN (Print): 0927-0248
Ratings:
Scopus rating (2016): CiteScore 4.97 SJR 1.587 SNIP 1.71
Scopus rating (2015): SJR 1.869 SNIP 1.896 CiteScore 5.16
Scopus rating (2014): SJR 2.204 SNIP 2.396 CiteScore 5.87
Scopus rating (2013): SJR 2.174 SNIP 2.582 CiteScore 5.58
Scopus rating (2012): SJR 2.435 SNIP 2.707 CiteScore 5.25
Scopus rating (2011): SJR 2.175 SNIP 2.638 CiteScore 5.16
Scopus rating (2010): SJR 2.524 SNIP 2.121
Scopus rating (2009): SJR 1.991 SNIP 1.977
Scopus rating (2008): SJR 1.654 SNIP 1.458
Scopus rating (2007): SJR 1.359 SNIP 1.488
Scopus rating (2006): SJR 1.447 SNIP 1.799
Scopus rating (2005): SJR 1.141 SNIP 1.619
Scopus rating (2004): SJR 0.932 SNIP 1.178
Scopus rating (2003): SJR 0.992 SNIP 1.34
Scopus rating (2002): SJR 1.042 SNIP 1.114
Scopus rating (2001): SJR 0.896 SNIP 1.235
Scopus rating (2000): SJR 0.828 SNIP 0.986
Scopus rating (1999): SJR 0.701 SNIP 0.75
Original language: English
DOIs:
10.1016/j.solmat.2014.05.043

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.
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
First comprehensive inter-comparison of aerosol electrometers for particle sizes up to 200 nm and concentration range 1000 cm\(^{-3}\) to 17 000 cm\(^{-3}\)
Free radical scavenging and formation by multi-walled carbon nanotubes in cell free conditions and in human bronchial epithelial cells

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Materials Science, Engineering materials science and solutions (EMASS)
Number of pages: 18
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Particle and Fibre Toxicology
Volume: 11
Issue number: 4
ISSN (Print): 1743-8977
Ratings:
Scopus rating (2016): SJR 2.742 SNIP 2.165 CiteScore 9.4
Scopus rating (2015): SJR 3 SNIP 2.013 CiteScore 8.84
Scopus rating (2014): SJR 2.359 SNIP 1.81 CiteScore 6.94
Scopus rating (2013): SJR 2.713 SNIP 2.388 CiteScore 8.5
Scopus rating (2012): SJR 3.032 SNIP 2.075 CiteScore 8.84
Scopus rating (2011): SJR 2.705 SNIP 1.887 CiteScore 7.51
Scopus rating (2010): SJR 2.102 SNIP 1.385
Scopus rating (2009): SJR 2.138 SNIP 1.743
Scopus rating (2008): SJR 2.152 SNIP 1.82
Scopus rating (2007): SJR 1.781 SNIP 1.734
Scopus rating (2006): SJR 1.47 SNIP 1.707
Scopus rating (2005): SJR 0.499 SNIP 0.298
Original language: English
DOIs:
10.1186/1743-8977-11-4

Bibliographical note
Contribution: organisation=mol,FACT1=1<br/>Portfolio EDEND: 2014-06-27<br/>Publisher name: BioMed Central
Source: researchoutputwizard
Source-ID: 1173
Research output: Scientific - peer-review › Article
Geometrical effects in second-harmonic generation from metal nanoparticles

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: Czaplicki, R., Slikanen, R., Mäkitalo, J., Husu, H., Lehtolahti, J., Kuittinen, M., Kauranen, M.
Number of pages: 2
Pages: 1-2
Publication date: 2014

Host publication information
Title of host publication: CLEO 2014, 8-13 June, 2014, San Jose, California
ISBN (Print): 978-1-55752-999-2
DOIs: 10.1364/CLEO_QELS.2014.FTh4K.5

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2014-10-02
Source: researchoutputwizard
Source-ID: 244
Research output: Scientific - peer-review › Conference contribution

Hard nanodiamonds in soft rubbers: Past, present and future - A review

General information
State: Published
Ministry of Education publication type: A2 Review article in a scientific journal
Organisations: Department of Materials Science, Engineering materials science and solutions (EMASS)
Authors: Shakun, A., Vuorinen, J., Hoikkanen, M., Poikelispää, M., Das, A.
Number of pages: 11
Pages: 49-69
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Composites part a: applied science and manufacturing
Issue number: 6
ISSN (Print): 1359-835X
Ratings:
Scopus rating (2016): CiteScore 4.82 SJR 1.402 SNIP 2.053
Scopus rating (2015): SJR 1.53 SNIP 2.18 CiteScore 4.09
Scopus rating (2014): SJR 1.67 SNIP 2.538 CiteScore 4.08
Scopus rating (2013): SJR 1.59 SNIP 2.828 CiteScore 3.92
Scopus rating (2012): SJR 1.559 SNIP 2.706 CiteScore 3.36
Scopus rating (2011): SJR 1.443 SNIP 2.499 CiteScore 3.23
Scopus rating (2010): SJR 1.553 SNIP 2.241
Scopus rating (2009): SJR 1.536 SNIP 1.976
Scopus rating (2008): SJR 1.388 SNIP 1.853
Scopus rating (2007): SJR 1.222 SNIP 2.188
Scopus rating (2006): SJR 1.208 SNIP 2.268
Scopus rating (2005): SJR 1.109 SNIP 2.103
Scopus rating (2004): SJR 1.159 SNIP 1.671
Scopus rating (2003): SJR 1.132 SNIP 1.411
Scopus rating (2002): SJR 1.308 SNIP 1.512
Scopus rating (2001): SJR 1.426 SNIP 1.33
Scopus rating (2000): SJR 1.273 SNIP 1.298
Scopus rating (1999): SJR 0.824 SNIP 1.104
Original language: English
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
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:
10.1364/OE.22.029398

High power cavity-adjusted semiconductor disc lasers emitting in the 1310 nm waveband

General information
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
- 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
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., Lyytikäinen, 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
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
DOIs:
10.1063/1.4868535

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2014-04-29<br/>Publisher name: American Institute of Physics
Source: researchoutputwizard
Source-ID: 1349
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

High-speed Sliding Friction of Laser-textured Silicon Nitride in Water against Rubber
The effects of a specific laser patterning on friction of silicon nitride bulk ceramic in water against rubber were investigated. A dimple-like patterning was applied to the surfaces of silicon nitride bulk ceramic blocks with pulsed laser drilling. Friction measurements were conducted with a special device designed for high-velocity sliding wear and friction testing of hard materials in wet conditions. Sliding velocities in the water-lubricated test ranged from 3.3 to 33 m/s and the load was 80 N. Anomalies in friction behaviour were observed in 8.3 and 16.7 m/s, which can only partially be explained with test equipment characteristics.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Materials Science, Research group: Ceramic materials, Department of Mechanical Engineering and Industrial Systems, Research group: Laser, Research area: Manufacturing and Automation
Authors: Ismailov, A., Kumpulainen, T., Vihinen, J., Levänen, E.
Number of pages: 7
Pages: 267-273
Publication date: 2014

Host publication information
Title of host publication: Proceedings of the Twenty Eighth International Conference on Surface Modification Technologies
ISBN (Print): 978-81-926196-1-3
Keywords: Friction, Silicon Nitride, Sliding, Wear, Laser
Electronic versions:
high_speed_sliding_friction
Links:
http://urn.fi/URN:NBN:fi:ttty-201610194615

Bibliographical note
ORG=mei,0.5
ORG=mol,0.5
Research output: Scientific - peer-review » Conference contribution

Improving the effect of nanoscale barrier coating on BOPP film properties: Influence of substrate contamination, web handling and pretreatments

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Materials Science, Research group: Paper Converting and Packaging, Engineering materials science and solutions (EMASS)
Authors: Lahti, J., Johansson, P., Lahtinen, K., Cameron, D. C., Seppänen, T.
Number of pages: 23
Pages: 1039-1061
Publication date: 2014

Host publication information
Title of host publication: TAPPI PLACE Conference 2014
Volume: 2
Publisher: TAPPI Press
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

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2014-12-31<br/>Publisher name: American Institute of Physics
Source: researchoutputwizard
Source-ID: 57
Research output: Scientific - peer-review » Article

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

General information
State: Published
Inhalation or rod-like carbon nanotubes causes unconventional allergic airway inflammation

**General information**
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Materials Science, Engineering materials science and solutions (EMASS)
Number of pages: 17
Pages: 1-17
Publication date: 2014
Peer-reviewed: Yes

**Publication information**
Journal: Particle and Fibre Toxicology
Volume: 11
Issue number: 48
ISSN (Print): 1743-8977
Ratings:
Scopus rating (2016): SJR 2.742 SNIP 2.165 CiteScore 9.4
Scopus rating (2015): SJR 3 SNIP 2.013 CiteScore 8.84
Scopus rating (2014): SJR 2.359 SNIP 1.81 CiteScore 6.94
Scopus rating (2013): SJR 2.713 SNIP 2.388 CiteScore 8.5
Scopus rating (2012): SJR 3.032 SNIP 2.075 CiteScore 8.84
Scopus rating (2011): SJR 2.705 SNIP 1.887 CiteScore 7.51
Scopus rating (2010): SJR 2.102 SNIP 1.385
Scopus rating (2009): SJR 2.138 SNIP 1.743
Scopus rating (2008): SJR 2.152 SNIP 1.82
Scopus rating (2007): SJR 1.781 SNIP 1.734
Scopus rating (2006): SJR 1.47 SNIP 1.707
Scopus rating (2005): SJR 0.499 SNIP 0.298
Original language: English
DOIs:
10.1186/s12989-014-0048-2
Links:
http://www.particleandfibretoxicology.com/content/11/1/48

**Bibliographical note**
Contribution: organisation=mol,FACT1=1<br/>Portfolio EDEND: 2014-12-01<br/>Publisher name: BioMed Central
Multifunctional superhydrophobic nanoparticle coatings for cellulose-based substrates by liquid flame spray

General information
State: Published
Ministry of Education publication type: D1 Article in a trade journal
Organisations: Department of Materials Science
Authors: Teisala, H.
Number of pages: 1
Pages: 59
Publication date: 2014
Peer-reviewed: Unknown

Publication information
Journal: Materia
Issue number: 1
ISSN (Print): 1459-9694
Original language: Finnish
Links:
http://www.vuorimiesyhdistys.fi/sites/default/files/materia/pdf/Materia%201-2014_0.pdf

Bibliographical note
Contribution: organisation=mol,FACT1=1<br/>Portfolio EDEND: 2014-09-05<br/>Publisher name: Vuorimiesyhdistys
Source: researchoutputwizard
Source-ID: 1608
Research output: Professional › Article

Nanoparticle Depositon on Packaging Materials by Liquid Flame Spray: Generation of Superhydrophilic and Superhydrophobic Coatings

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Materials Science, Department of Physics
Authors: Teisala, H., Tuominen, M., Aromaa, M., Stepień, M., Mäkelä, J. M., Saarinen, J. J., Toivakka, M., Kuusipalo, J.
Number of pages: 13
Pages: 331-343
Publication date: 2014
Paper-based microfluidics: Fabrication technique and dynamics of capillary driven surface flow

General information
State: Published
Organisations: Department of Materials Science, Department of Physics, Engineering materials science and solutions (EMASS)
Authors: Songok, J., Tuominen, M., Teisala, H., Haapanen, J., Mäkelä, J. M., Kuusipalo, J., Toivakka, M.
Number of pages: 7
Pages: 20060-20066
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: ACS Applied Materials and Interfaces
Volume: 6
Issue number: 22
ISSN (Print): 1944-8244
Ratings:
Scopus rating (2016): CiteScore 7.6 SJR 2.524 SNIP 1.528
Scopus rating (2015): SJR 2.299 SNIP 1.568 CiteScore 7.38
Scopus rating (2014): SJR 2.126 SNIP 1.64 CiteScore 6.88
Scopus rating (2013): SJR 1.979 SNIP 1.543 CiteScore 6.05
Scopus rating (2012): SJR 2.18 SNIP 1.309 CiteScore 4.94
Scopus rating (2011): SJR 2.017 SNIP 1.396 CiteScore 4.41
Scopus rating (2010): SJR 1.571 SNIP 0.931
Original language: English
DOIs: 10.1021/am5055806

Bibliographical note
Contribution: organisation=mol,FACT1=0.5<br/>
Contribution: organisation=fys,FACT2=0.5<br/>
Portfolio EDEND: 2014-12-30<br/>
Publisher name: American Chemical Society
Source: researchoutputwizard
Source-ID: 1538
Research output: Scientific - peer-review › Article

Performance assessment of multijunction solar cells incorporating GaInNAsSb

General information
State: Published
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Aho, A., Tukiainen, A., Polojärvi, V., Guina, M.
Number of pages: 7
Pages: 1-7
Publication date: 2014
Peer-reviewed: Yes
Review on Liquid Flame Spray in paper converting: Multifunctional superhydrophobic nanoparticle coatings

Wettability of a solid surface by a liquid plays an important role in several phenomena and applications, for example in adhesion, printing, and coating. Especially, wetting of rough surfaces has attracted a considerable scientific interest in recent decades. Superhydrophobic surfaces, which possess extraordinary water repellency properties due to their low surface energy chemistry and specific nano- and microscale roughness, are of particular interest due to the great variety of potential applications ranging from self-cleaning surfaces to microfluidic devices. Here we examine functional superhydrophobic and superhydrophilic nanoparticle coatings fabricated by liquid flame spray (LFS) on cellulose-based substrate materials. The article is a review of earlier papers with some new results and conclusions added. LFS has proved itself straightforward and versatile one-step method to fabricate broad range of functional nanoparticle coatings on various substrate materials in an atmospheric roll-to-roll process. It has established itself among the most potential candidates for large-scale production of superhydrophobic coatings on affordable cellulose-based substrates.

General information
State: Published
Ministry of Education publication type: A2 Review article in a scientific journal
Organisations: Department of Materials Science, Department of Physics, Research area: Aerosol Physics, Research group: Aerosol Synthesis, Engineering materials science and solutions (EMASS)
Authors: Teisala, H., Tuominen, M., Haapanen, J., Aromaa, M., Stepień, M., Mäkelä, J. M., Saarinen, J. J., Toivakka, M., Kuusipalo, J.
Number of pages: 13
Pages: 747-759
Publication date: 2014
Peer-reviewed: Yes

Publication information
Volume: 29
Issue number: 4
ISSN (Print): 0283-2631
Ratings:
Scopus rating (2016): CiteScore 1.2 SJR 0.385 SNIP 0.652
Scopus rating (2015): SJR 0.375 SNIP 0.787 CiteScore 0.91
Scopus rating (2014): SJR 0.444 SNIP 0.823 CiteScore 0.99
Scopus rating (2013): SJR 0.389 SNIP 0.684 CiteScore 0.71
Scopus rating (2012): SJR 0.628 SNIP 1.281 CiteScore 1.13
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.
Selective morphologies of MgO via nanoconfinement on y-Al2O3 and reduced graphite oxide (rGO): improved CO2 capture capacity at elevated temperatures

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Materials Science, Engineering materials science and solutions (EMASS)
Authors: Zhang, X., Qui, K., Levänen, E., Guo, X. Z.
Number of pages: 7
Pages: 8825-8831
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: CrystEngComm
Issue number: 16
ISSN (Print): 1466-8033
Ratings:
Scopus rating (2016): SJR 1.043 SNIP 0.904 CiteScore 3.37
Scopus rating (2015): SJR 1.063 SNIP 0.999 CiteScore 3.83
Scopus rating (2014): SJR 1.131 SNIP 1.11 CiteScore 3.97
Scopus rating (2013): SJR 1.079 SNIP 1.11 CiteScore 3.81
Scopus rating (2012): SJR 1.253 SNIP 1.142 CiteScore 3.83
Scopus rating (2011): SJR 1.174 SNIP 1.191 CiteScore 3.87
Scopus rating (2010): SJR 1.233 SNIP 1.229
Scopus rating (2009): SJR 1.227 SNIP 1.257
Scopus rating (2008): SJR 1.297 SNIP 1.183
Scopus rating (2007): SJR 1.42 SNIP 1.704
Scopus rating (2006): SJR 1.296 SNIP 1.406
Scopus rating (2005): SJR 1.419 SNIP 1.051
Scopus rating (2004): SJR 1 SNIP 0.951
Scopus rating (2003): SJR 0.73 SNIP 0.751
Scopus rating (2002): SJR 0.228 SNIP 0.509
Scopus rating (2001): SJR 0.138 SNIP 0.153
Scopus rating (2000): SJR 0.102 SNIP 0
Original language: English
DOIs: 10.1039/c4ce01258e

Bibliographical note
Contribution: organisation=mol,FACT1=1<br/>Portfolio EDEND: 2014-09-29<br/>Publisher name: Royal Society of Chemistry
Source: researchoutputwizard
Source-ID: 1846
Research output: Scientific - peer-review › Article

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
Simulation of crystallization in Ge2Sb2Te5: A memory effect in the canonical phase-change materials

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: Kalikka, J., Akola, J., Jones, O.
Number of pages: 9
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Physical Review B
Volume: 90
Article number: 184109
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
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
Scopus rating (1999): SJR 3.077 SNIP 1.588
Original language: English
DOIs:
10.1103/PhysRevB.90.184109

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2014-12-17<br/>Publisher name: American Physical Society
Source: researchoutputwizard
Source-ID: 639
Surface modification of thin film composite polyamide membrane using atomic layer deposition method

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Materials Science, Engineering materials science and solutions (EMASS)
Authors: Nikkola, J., Sievänen, J., Raulio, M., Jing, W., Vuorinen, J., Tang Y., C.
Number of pages: 7
Pages: 174-180
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Journal of Membrane Science
Volume: 450
ISSN (Print): 0376-7388
Ratings:
Scopus rating (2016): SJR 2.062 SNIP 1.72 CiteScore 6.13
Scopus rating (2015): SJR 2 SNIP 1.771 CiteScore 5.89
Scopus rating (2014): SJR 2.433 SNIP 1.935 CiteScore 5.42
Scopus rating (2013): SJR 2.452 SNIP 2.001 CiteScore 5.38
Scopus rating (2012): SJR 2.201 SNIP 1.968 CiteScore 4.37
Scopus rating (2011): SJR 1.82 SNIP 1.726 CiteScore 4.29
Scopus rating (2010): SJR 1.802 SNIP 1.821
Scopus rating (2009): SJR 1.638 SNIP 1.693
Scopus rating (2008): SJR 1.461 SNIP 1.805
Scopus rating (2007): SJR 1.474 SNIP 1.578
Scopus rating (2006): SJR 1.812 SNIP 2.444
Scopus rating (2005): SJR 1.745 SNIP 1.823
Scopus rating (2004): SJR 1.559 SNIP 1.668
Scopus rating (2003): SJR 1.472 SNIP 1.666
Scopus rating (2002): SJR 1.208 SNIP 1.856
Scopus rating (2001): SJR 1.301 SNIP 1.644
Scopus rating (2000): SJR 1.104 SNIP 1.715
Scopus rating (1999): SJR 1.39 SNIP 1.522
Original language: English
DOIs: 10.1016/j.memsci.2013.09.005

Bibliographical note
Contribution: organisation=mol,FACT1=1<br/>Portfolio EDEND: 2014-12-15<br/>Publisher name: Elsevier
Source: researchoutputwizard
Source-ID: 1147
Research output: Scientific - peer-review › Article

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
Topically applied ZnO nanoparticles suppress allergen induced skin inflammation but induce vigorous IgE production in the atopic dermatitis mouse model

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Materials Science, Engineering materials science and solutions (EMASS)
Authors: Ilves, M., Palomäki, J., Vippola, M., Lehto, M., Savolainen, K., Savinko, T., Alenius, H.
Number of pages: 12
Pages: 1-12
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Particle and Fibre Toxicology
Volume: 11
Issue number: 38
ISSN (Print): 1743-8977
Ratings:
Scopus rating (2016): SJR 2.742 SNIP 2.165 CiteScore 9.4
Scopus rating (2015): SJR 3 SNIP 2.013 CiteScore 8.84
Scopus rating (2014): SJR 2.359 SNIP 1.81 CiteScore 6.94
Scopus rating (2013): SJR 2.713 SNIP 2.388 CiteScore 8.5
Scopus rating (2012): SJR 3.032 SNIP 2.075 CiteScore 8.84
Scopus rating (2011): SJR 2.705 SNIP 1.887 CiteScore 7.51
Scopus rating (2010): SJR 2.102 SNIP 1.385
Scopus rating (2009): SJR 2.138 SNIP 1.743
Scopus rating (2008): SJR 2.152 SNIP 1.82
Scopus rating (2007): SJR 1.781 SNIP 1.734
Scopus rating (2006): SJR 1.47 SNIP 1.707
Scopus rating (2005): SJR 0.499 SNIP 0.298
Original language: English
DOIs: 10.1186/s12989-014-0038-4
UV protective zinc oxide coating for biaxially oriented polypropylene packaging film by atomic layer deposition

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Materials Science, Engineering materials science and solutions (EMASS)
Authors: Lahtinen, K., Kääriäinen, T., Johansson, P., Kotkamo, S., Maydannik, P., Seppänen, T., Kuusipalo, J., Cameron, D. D.
Number of pages: 5
Pages: 33-37
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Thin Solid Films
Volume: 570
ISSN (Print): 0040-6090
Ratings:
Scopus rating (2016): CiteScore 1.83 SJR 0.64 SNIP 0.897
Scopus rating (2015): SJR 0.705 SNIP 0.98 CiteScore 1.84
Scopus rating (2014): SJR 0.73 SNIP 1.115 CiteScore 1.94
Scopus rating (2013): SJR 0.818 SNIP 1.215 CiteScore 2
Scopus rating (2012): SJR 0.899 SNIP 1.162 CiteScore 1.86
Scopus rating (2011): SJR 0.995 SNIP 1.337 CiteScore 2.13
Scopus rating (2010): SJR 1.141 SNIP 1.235
Scopus rating (2009): SJR 1.142 SNIP 1.221
Scopus rating (2008): SJR 1.191 SNIP 1.282
Scopus rating (2006): SJR 1.147 SNIP 1.318
Scopus rating (2005): SJR 1.173 SNIP 1.246
Scopus rating (2004): SJR 1.188 SNIP 1.308
Scopus rating (2003): SJR 1.231 SNIP 1.282
Scopus rating (2002): SJR 1.175 SNIP 1.14
Scopus rating (2001): SJR 1.032 SNIP 1.032
Scopus rating (2000): SJR 0.99 SNIP 0.924
Scopus rating (1999): SJR 0.914 SNIP 0.862
Original language: English
DOI: 10.1016/j.tsf.2014.09.011

Wafer-fused VECSELs emitting in the 1310nm waveband

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Wafer fused, wavelength controlled 1300 nm vertical external cavity surface emitting lasers

1.56 μm 1 watt single frequency semiconductor disk laser
1 Watt from 1.56 µm Single Frequency Semiconductor Disk Laser

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre
Authors: Rantamäki, A., Rautiainen, J., Sirbu, A., Mereuta, A., Kapon, E., 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: 3226
Research output: Scientific - peer-review › Conference contribution

Actively Mode-Locked Semiconductor Disk Laser Using Vertical Cavity Modulator

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Frontier Photonics
Coating of gold nanoparticles made by pulsed laser ablation in liquids with silica shells by simultaneous chemical synthesis
Enhancement in photoluminescence from 1 eV GaInNAs epilayers subject to 7 MeV electron irradiation

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Pavelescu, E., Kudrawiec, R., Bălăteanu, N., Spanulescu, S., Dumitrescu, M., Guina, M.
Number of pages: 5
Pages: 1-5
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Semiconductor Science and Technology
Volume: 28
Issue number: 2
ISSN (Print): 0268-1242
Ratings:
Scopus rating (2016): SJR 0.632 SNIP 0.866 CiteScore 1.75
Scopus rating (2015): SJR 0.675 SNIP 0.977 CiteScore 1.73
Scopus rating (2014): SJR 0.991 SNIP 1.088 CiteScore 1.72
Scopus rating (2013): SJR 1.173 SNIP 1.133 CiteScore 1.53
Scopus rating (2012): SJR 1.051 SNIP 0.982 CiteScore 1.42
Scopus rating (2011): SJR 1.01 SNIP 1.08 CiteScore 1.66
Scopus rating (2010): SJR 0.82 SNIP 0.88
Scopus rating (2009): SJR 0.886 SNIP 0.914
Scopus rating (2008): SJR 1.298 SNIP 1.291
Scopus rating (2007): SJR 1.252 SNIP 1.161
Scopus rating (2006): SJR 1.193 SNIP 1.095
Scopus rating (2005): SJR 1.216 SNIP 1.133
Scopus rating (2004): SJR 1.42 SNIP 1.142
Scopus rating (2003): SJR 1.235 SNIP 0.981
Scopus rating (2002): SJR 0.996 SNIP 0.925
Scopus rating (2001): SJR 0.962 SNIP 0.845
Scopus rating (2000): SJR 1.193 SNIP 0.811
Scopus rating (1999): SJR 1.193 SNIP 0.874
Original language: English
DOIs: 10.1088/0268-1242/28/2/025020

Extending the direct laser modulation bandwidth by exploiting the photon-photon resonance: modeling, simulations and experiments

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Gas phase synthesis of encapsulated iron oxide-titanium dioxide composite nanoparticles by spray pyrolysis

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Aerosol Physics, Department of Materials Science, Department of Physics, Optoelectronics Research Centre, Engineering materials science and solutions (EMASS), Frontier Photonics
Authors: Harra, J., Nikkanen, J., Aromaa, M., Suhonen, H., Honkanen, M., Salminen, T., Heinonen, S., Levänen, E., Mäkelä, J.
Number of pages: 8
Pages: 46-52
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Powder Technology
Volume: 243
ISSN (Print): 0032-5910
Ratings:
Scopus rating (2016): SJR 0.983 SNIP 1.482 CiteScore 3.16
Scopus rating (2015): SJR 0.965 SNIP 1.598 CiteScore 2.99
Scopus rating (2014): SJR 0.89 SNIP 1.649 CiteScore 2.67
Scopus rating (2013): SJR 0.901 SNIP 1.875 CiteScore 2.64
Scopus rating (2012): SJR 0.854 SNIP 1.826 CiteScore 2.36
Scopus rating (2011): SJR 0.921 SNIP 1.86 CiteScore 2.45
Scopus rating (2010): SJR 0.94 SNIP 1.547
Scopus rating (2009): SJR 0.98 SNIP 1.65
Scopus rating (2008): SJR 0.911 SNIP 1.597
Scopus rating (2007): SJR 0.854 SNIP 1.316
Scopus rating (2006): SJR 1.118 SNIP 1.324
Scopus rating (2005): SJR 1.253 SNIP 1.399
Scopus rating (2004): SJR 0.867 SNIP 1.341
Scopus rating (2003): SJR 1.348 SNIP 1.489
Scopus rating (2002): SJR 1.285 SNIP 1.369
High current generation in dilute nitride solar cells grown by molecular beam epitaxy

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Aho, A., Tukiainen, A., Polojärvi, V., Salmi, J., Guina, M.
Number of pages: 6
Pages: 1-6
Publication date: 2013

Host publication information
Title of host publication: Physics, Simulation, and Photonic Engineering of Photovoltaic Devices II. SPIE Photonic West O PTO 2013, Feb 2-7, 2013, San Francisco, CA, U.S.A.
Place of publication: Bellingham, WA
Publisher: SPIE
Article number: 8620-55
ISBN (Print): 978-0-8194-9389-7

Publication series
Name: SPIE Conference Proceedings
Volume: 8620
No.: 55
ISSN (Print): 0277-786X
DOIs:
10.1117/12.2002972

Bibliographical note
Contribution: organisation=orc,FACT1=1
Portfolio EDEND: 2013-07-29
Publisher name: SPIE
Source-ID: 1884
Research output: Scientific - peer-review › Conference contribution

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-Speed Directly-Modulated Lasers with Photon-Photon Resonance

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Dumitrescu, M., Laakso, A., Viheriälä, J., Kamp, M., Melanen, P., Uusimaa, P.
Number of pages: 3
Pages: 1-3
Publication date: 2013

Host publication information
Title of host publication: National Fiber Optic Engineers Conference, OFC-NFOEC, March 17 - 21, 2013, Anaheim, CA, USA
Place of publication: Washington, DC
Publisher: Optical Society of America
ISBN (Print): 978-1-55752-962-6

Publication series
Name: Optical Fiber Communication Conference and Exposition and the National Fiber Optic Engineers Conference
DOIs:
10.1364/NFOEC.2013.JW2A.33

Bibliographical note
JW2A.33<br>Contribution: organisation=orc,FACT1=1<br>Portfolio EDEND: 2013-11-29<br>Publisher name: Optical Society of America
Source: researchoutputwizard
Source-ID: 2094
Research output: Scientific - peer-review › Conference contribution

High-Speed Distributed-Feedback Lasers with Nanoscale Surface Gratings

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Dumitrescu, M., Laakso, A., Viheriälä, J., Bardella, P., Montrosset, I.
Number of pages: 3
Pages: 1-3
Publication date: 2013

Host publication information
Title of host publication: 4th International Conference on Photonics, ICP2013, 28-30 October, 2013, Melaka, Malaysia
Place of publication: New York, NY
Publisher: IEEE Photonics Society
Article number: 1569796199
ISBN (Print): 978-1-4673-6075-3

Publication series
Name: International Conference on Photonics
DOIs:
10.1109/ICP.2013.6687130

Bibliographical note
Contribution: organisation=orc,FACT1=1<br>Portfolio EDEND: 2013-11-29<br>Publisher name: IEEE Photonics Society
Source: researchoutputwizard
Source-ID: 2092
Research output: Scientific - peer-review › Conference contribution

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
Moth-eye antireflection coating fabricated by nanoimprint lithography on 1 eV dilute nitride solar cell

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Tommila, J., Aho, A., Tukiainen, A., Polojärvi, V., Salmi, J., Niemi, T., Guina, M.
Number of pages: 5
Pages: 1158-1162
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Progress in Photovoltaics: Research and Applications
Volume: 21
Issue number: 5
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
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
Nanoscale Surface Processing of Extrusion Coated Substrates with Atmospheric Plasma Technology

General information
State: Published
Organisations: Department of Materials Science, Research group: Paper Converting and Packaging, Engineering materials science and solutions (EMASS)
Authors: Lahti, J.
Publication date: 2013
Peer-reviewed: Unknown
Research output: Scientific › Paper, poster or abstract

Nanoscale surface properties of a Ni–Mn–Ga 10M magnetic shape memory alloy

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Surface Science, Frontier Photonics
Authors: Aaltio, I., Liu, X., Valden, M., Lahtonen, K., Söderberg, O., Ge, Y.
Number of pages: 5
Pages: 367-371
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Journal of Alloys and Compounds
Volume: 577
Issue number: S1
ISSN (Print): 0925-8388
Ratings:
Scopus rating (2016): CiteScore 3.05 SJR 0.961 SNIP 1.321
Scopus rating (2015): SJR 0.987 SNIP 1.43 CiteScore 3.03
Scopus rating (2014): SJR 1.135 SNIP 1.66 CiteScore 3.13
Scopus rating (2013): SJR 1.064 SNIP 1.597 CiteScore 2.73
Scopus rating (2012): SJR 1.249 SNIP 1.584 CiteScore 2.43
Scopus rating (2011): SJR 1.166 SNIP 1.479 CiteScore 2.41
Scopus rating (2010): SJR 1.07 SNIP 1.221
Scopus rating (2009): SJR 0.957 SNIP 1.367
Scopus rating (2008): SJR 0.899 SNIP 1.207
Scopus rating (2007): SJR 0.889 SNIP 1.216
Scopus rating (2006): SJR 0.897 SNIP 1.147
Scopus rating (2005): SJR 1.074 SNIP 1.212
Scopus rating (2004): SJR 0.903 SNIP 1.35
Scopus rating (2003): SJR 0.909 SNIP 1.04
On photoluminescence and photoreflectance of 1-eV GaInNAs-on-GaAs epilayers

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Pavelescu, E., Kudrawiec, R., Dumitrescu, M.
Number of pages: 4
Pages: 67-70
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Journal of Luminescence
Volume: 141
ISSN (Print): 0022-2313
Ratings:
Scopus rating (2016): CiteScore 2.61 SJR 0.723 SNIP 1.14
Scopus rating (2015): SJR 0.787 SNIP 1.22 CiteScore 2.68
Scopus rating (2014): SJR 0.811 SNIP 1.386 CiteScore 2.72
Scopus rating (2013): SJR 0.744 SNIP 1.247 CiteScore 2.42
Scopus rating (2012): SJR 0.835 SNIP 1.271 CiteScore 2.17
Scopus rating (2011): SJR 0.824 SNIP 1.268 CiteScore 2.19
Scopus rating (2010): SJR 0.906 SNIP 1.116
Scopus rating (2009): SJR 0.961 SNIP 1.192
Scopus rating (2008): SJR 0.967 SNIP 1.11
Scopus rating (2007): SJR 0.906 SNIP 1.153
Scopus rating (2006): SJR 0.892 SNIP 1.154
Scopus rating (2005): SJR 0.917 SNIP 1.175
Scopus rating (2004): SJR 0.947 SNIP 1.196
Scopus rating (2003): SJR 0.951 SNIP 1.019
Scopus rating (2002): SJR 0.958 SNIP 0.983
Scopus rating (2001): SJR 0.764 SNIP 0.944
Scopus rating (2000): SJR 0.687 SNIP 0.731
Scopus rating (1999): SJR 0.709 SNIP 0.715
Original language: English
DOIs:
10.1016/j.jlumin.2013.02.041

Bibliographical note
Contribution: organisation=orc,FACT1=1
Portfolio EDEND: 2013-07-29
Publisher name: Elsevier
Source: researchoutputwizard
Source-ID: 3116
Research output: Scientific - peer-review ➜ Article
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., Valden, M.
Number of pages: 2
Pages: 1-2
Publication date: 2013

Host publication information
Place of publication: Lund, Sweden
Publisher: MAX-LAB
Links:
https://www.maxlab.lu.se/cmis/display?id=workspace%3A%2F%2FSpacesStore%2F0f1d8b0b-533a-48e6-a4cf-a850907767f6
https://www.maxlab.lu.se/node/1693

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2013-11-29
Source: researchoutputwizard
Source-ID: 1912
Research output: Scientific › Chapter

Optimization of the electrical properties of Ti-Nb stabilized ferritic stainless steel SOFC interconnect alloy upon high-temperature oxidation: The role of excess Nb on the interfacial oxidation at the oxidemetal interface

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Surface Science, Frontier Photonics
Authors: Ali-Löytty, H., Jussila, P., Valden, M.
Number of pages: 13
Pages: 1039-1051
Publication date: 2013
Peer-reviewed: Yes

Publication information
Volume: 38
Issue number: 2
ISSN (Print): 0360-3199
Ratings:
Scopus rating (2016): CiteScore 3.74 SJR 1.142 SNIP 1.286
Scopus rating (2015): SJR 1.294 SNIP 1.319 CiteScore 3.46
Scopus rating (2014): SJR 1.212 SNIP 1.494 CiteScore 3.54
Scopus rating (2013): SJR 1.278 SNIP 1.467 CiteScore 3.38
Scopus rating (2012): SJR 1.515 SNIP 1.729 CiteScore 3.96
Scopus rating (2011): SJR 1.456 SNIP 1.837 CiteScore 4.42
Scopus rating (2010): SJR 1.589 SNIP 1.871
Scopus rating (2009): SJR 1.333 SNIP 1.885
Scopus rating (2008): SJR 1.401 SNIP 2.096
Scopus rating (2007): SJR 1.279 SNIP 2.201
Scopus rating (2006): SJR 1.073 SNIP 2.161
Scopus rating (2005): SJR 1.107 SNIP 1.787
Scopus rating (2004): SJR 1.225 SNIP 1.626
Scopus rating (2003): SJR 1.003 SNIP 1.319
Properties of InAs Quantum Dots in Nanoimprint Lithography Patterned GaAs Pits

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Augmented Human Activities (AHA), Frontier Photonics
Authors: Tommila, J., Schramm, A., Hakkarainen, T., Dumitrescu, M., Guina, M., Heinonen, E.
Number of pages: 2
Pages: 1-2
Publication date: 2013

Host publication information
Title of host publication: CLEO 2013: Applications and Technology, June 9-14, 2013, San Jose, CA, USA
Place of publication: Washington, D.C.
Publisher: OSA - The Optical Society

Publication series
Name: Conference on Lasers and Electro-optics
DOIs:
10.1364/CLEO_AT.2013.JTu4A.65

Bibliographical note
JTu4A.65<br/>Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2013-09-29<br/>Publisher name: OSA - The Optical Society
Source: researchoutputwizard
Source-ID: 3550
Research output: Scientific - peer-review › Conference contribution

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 Photonics 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
SERS Active Substrates by Liquid Flame Spray and Inkjet Printed Silver Nanoparticles

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Physics, Optoelectronics Research Centre, Engineering materials science and solutions (EMASS), Frontier Photonics
Authors: Saarinen, J. J., Valtakari, D., Haapanen, J., Salminen, T., Mäkelä, J. M., Uozumi, J.
Number of pages: 4
Publication date: 2013

Host publication information
Title of host publication: Advanced Photonics Congress, Integrated Photonics Research, Silicon, and Nano-Photonics (IPR), July 14 - 17, 2013, Rio Grande, Puerto Rico United States
Publisher: The Optical Society; OSA
ISBN (Print): 978-1-55752-981-7

Publication series
Name: Advanced Photonics Congress
DOIs:
10.1364/SENSORS.2013.SW1B.4

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:
http://eac2013.cz/

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:
http://eac2013.cz/
Size-dependent properties of single InAs quantum dots grown in nanoimprint lithography patterned GaAs pits

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Augmented Human Activities (AHA), Frontier Photonics
Authors: Tomtila, J., Schramm, A., Hakkarainen, T. V., Dumitrescu, M., Guina, M.
Number of pages: 5
Pages: 1-5
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Nanotechnology
Volume: 24
Issue number: 23
ISSN (Print): 0957-4484
Ratings:
Scopus rating (2016): CiteScore 2.87 SJR 1.096 SNIP 0.814
Scopus rating (2015): SJR 1.18 SNIP 0.966 CiteScore 3.07
Scopus rating (2014): SJR 1.465 SNIP 1.258 CiteScore 3.09
Scopus rating (2013): SJR 1.585 SNIP 1.244 CiteScore 2.74
Scopus rating (2012): SJR 1.846 SNIP 1.306 CiteScore 3.34
Scopus rating (2011): SJR 1.892 SNIP 1.461 CiteScore 3.86
Scopus rating (2010): SJR 1.844 SNIP 1.259
Scopus rating (2009): SJR 1.819 SNIP 1.28
Scopus rating (2008): SJR 1.875 SNIP 1.333
Scopus rating (2007): SJR 1.91 SNIP 1.36
Scopus rating (2006): SJR 1.934 SNIP 1.378
Scopus rating (2005): SJR 1.925 SNIP 1.445
Scopus rating (2004): SJR 1.849 SNIP 1.477
Scopus rating (2003): SJR 1.427 SNIP 1.371
Scopus rating (2002): SJR 0.962 SNIP 0.993
Scopus rating (2001): SJR 0.901 SNIP 0.94
Scopus rating (2000): SJR 0.881 SNIP 0.891
Scopus rating (1999): SJR 1.131 SNIP 0.953
Original language: English
DOIs:
10.1088/0957-4484/24/23/235204

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2013-06-29<br/>Publisher name: Institute of Physics
Publishing IOP
Source: researchoutputwizard
Source-ID: 3552
Research output: Scientific - peer-review › Article

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
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
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

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, Innolume GmbH, Dortmund 44263, Germany, Photonics and Nanoscience Group, School of Engineering, Physics and Mathematics, University of Dundee, Dundee DD1 4HN, U.K.
Authors: Rantamäki, A., Rautiainen, J. T., Toikkanen, L. J., Krestnikov, I., Butkus, M., Rafailov, E. U., Okhotnikov, O.
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
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., Käämbre, T., Kikas, A., Kuusik, I., Kink, I., Hirsimäki, M., Kisand, V.
Pages: 953-965
Publication date: 2012
Peer-reviewed: Yes
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
Authors: Rantamäki, A., Rautiainen, J., Toikkanen, L., Krestnikov, I., Butkus, M., Rafailov, E. U., Okhotnikov, O. G.
Pages: 1292-1294
Publication date: 2012
Peer-reviewed: Yes

Publication information
Journal: IEEE Photonics Technology Letters
Volume: 24
Issue number: 15
Article number: 12817485
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.2012.2202222
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
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: 10.1364/OE.19.006433

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
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
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
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
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
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: 10.1364/OE.18.023872

Bibliographical note
Contribution: organisation=orc,FACT1=1
Source: researchoutputwizard
Source-ID: 7794
Research output: Scientific - peer-review › Article

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
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