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

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Photonics, Research group: ORC
Authors: Casula, R., Penttinen, J., Kemp, A. J., Guina, M., Hastie, J. E.
Number of pages: 7
Pages: 31377-31383
Publication date: 11 Dec 2017
Peer-reviewed: Yes

Publication information
Journal: Optics Express
Volume: 25
Issue number: 25
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
Keywords: VECSEL
ASJC Scopus subject areas: Atomic and Molecular Physics, and Optics
Electronic versions:
eo-25-25-31377
DOI:
10.1364/OE.25.031377
Links:
http://urn.fi/URN:NBN:fi:tty-201712222490
Research output: Scientific - peer-review › Article

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.
Structured Metal/Polymer Back Reflectors for III-V Solar Cells

We report on fabrication of microstructured metal/polymer back reflectors for light trapping in III-V solar cells. The asymmetric triangular grating provided the highest diffraction of the light when compared to half sphere and cylinder reflectors.
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

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Article number: 383001
ISSN (Print): 0022-3727
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Scopus rating (2015): SJR 0.693 SNIP 1.046 CiteScore 2.1
Scopus rating (2014): SJR 1.069 SNIP 1.383 CiteScore 2.53
Scopus rating (2013): SJR 1.18 SNIP 1.469 CiteScore 2.6
Scopus rating (2012): SJR 1.244 SNIP 1.394 CiteScore 2.31
Scopus rating (2011): SJR 1.257 SNIP 1.399 CiteScore 2.36
Scopus rating (2010): SJR 1.291 SNIP 1.288
Scopus rating (2009): SJR 1.283 SNIP 1.337
Scopus rating (2008): SJR 1.446 SNIP 1.563
Scopus rating (2007): SJR 1.385 SNIP 1.633
Scopus rating (2005): SJR 1.203 SNIP 1.466
Scopus rating (2004): SJR 1.123 SNIP 1.442
Scopus rating (2003): SJR 0.9 SNIP 1.2
Scopus rating (2002): SJR 0.99 SNIP 1.221
Scopus rating (2001): SJR 0.901 SNIP 1.205
Scopus rating (2000): SJR 0.79 SNIP 1.133
Scopus rating (1999): SJR 0.925 SNIP 1.249
Original language: English
Electronic versions:
Optically pumped VECSELs
DOIs:
10.1088/1361-6463/aa7bfd
Links:
http://urn.fi/URN:NBN:fi:ttty-201709251960
Research output: Scientific - peer-review › Review Article
Tunable narrow-linewidth VECSELs for atomic and molecular physics

General information
State: Published
Organisations: Photonics, National Institute of Standards and Technology, Time and Frequency Division, Boulder, Colorado
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
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Research output: Scientific > Paper, poster or abstract

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

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

General information
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Ministry of Education publication type: A1 Journal article-refereed
Organisations: Photonics, Research area: Optics, Research group: Applied Optics, Research group: Ultrafast Optics, Institut FEMTO-ST, UMR 6174 CNRS-Université de Franche-Comté
Authors: Amiot, C., Aalto, A., Ryczkowski, P., Toivonen, J., Genty, G.
Number of pages: 4
Publication date: Aug 2017
Peer-reviewed: Yes

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Volume: 111
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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
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: Unknown
Additional files:
LIC’17_MGuina_VECSELs_invited
Research output: Scientific › Paper, poster or abstract

Broadband Anti-reflective Coatings for Multi-junction Solar Cells

General information
State: Published
Organisations: Facilities and Infrastructure, Photonics, Research group: ORC
Number of pages: 1
Pages: 1
Publication date: 29 May 2017
Peer-reviewed: Unknown
Event: Paper presented at Optics and Photonics days 2017, Oulu, Finland.
ASJC Scopus subject areas: Atomic and Molecular Physics, and Optics
Keywords: anti-reflective coating, thin films, multi-junction solar cell, material characterization
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Poster_for_OPD17
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http://urn.fi/URN:NBN:fi:tty-201710312092

Bibliographical note
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Research output: Scientific › Paper, poster or abstract
Effect of growth parameters on the properties of GaAsBi

General information
State: Published
Organisations: Photonics, Research group: ORC
Authors: Hilska, J., Puustinen, J., Guina, M.
Publication date: 19 Mar 2017
Peer-reviewed: Unknown
Research output: Scientific › Paper, poster or abstract

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

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Optics, Research group: Nonlinear Optics, Photonics
Authors: Koskinen, K., Slablab, A., Divya, S., Czaplicki, R., Chervinskii, S., Kailasnath, M., Radhakrishnan, P., Kauranen, M.
Number of pages: 4
Pages: 1076-1079
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Scopus rating (2015): SJR 2.142 SNIP 1.642 CiteScore 3.53
Scopus rating (2014): SJR 2.497 SNIP 2.056 CiteScore 3.86
Scopus rating (2013): SJR 2.458 SNIP 2.095 CiteScore 3.95
Scopus rating (2012): SJR 2.596 SNIP 1.95 CiteScore 3.52
Scopus rating (2011): SJR 2.518 SNIP 2.475 CiteScore 3.69
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
Keywords: Nonlinear optics, Nonlinear optics, materials, Thin films, optical properties
DOIs:
10.1364/OL.42.001076
Source: Bibtex
Source-ID: urn:f773bbb3682f2c3ba8e9b5956617044e
Research output: Scientific - peer-review › Article
Subjective and objective rating of impact sound insulation of a concrete floor with various coverings

The aim of the study was to determine the associations between subjective rating of impact sounds directed to concrete floors and various single-number quantities (SNQ) of impact sound insulation. A psychoacoustic experiment was participated by 55 subjects in order to rate subjectively 44 sounds which were recordings of five actual impact sound sources directed to nine floor types. Eight objective SNQs were calculated. The squared Pearson correlation coefficients $R^2$ was determined between the objective SNQs and subjective annoyance or loudness. Statistically significant correlation between the SNQs and subjective ratings was detected for three sound types out of five. Of the SNQs presented in ISO 717-2, the best indicators of subjective loudness and annoyance regarding walking with hard-heeled and soft-heeled shoes and chair moving were $L_{n,w} + C_I$ and $L_{n,w} + C_{1,50–2500}$ followed by SNQs developed by Fasold, Gerretsen and Bodlund. $L_{n,w}$ and the SNQ developed by Hagberg correlated weaker with the subjective loudness and annoyance of the mentioned three sound types. The subjective ratings of walking with socks and superball bouncing were weakly or not at all correlated with the SNQs. As walking with socks is probably the most common impact sound type in some countries including the Nordic countries, the present SNQs do not cover all important sound types occurring in dwellings. Thus, there is a need for the development of new SNQs which would correlate better with general sound types.

General information
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Ministry of Education publication type: A1 Journal article-refereed
Organisations: Civil Engineering, Research group: Building Acoustics
Authors: Kylliäinen, M., Hongisto, V., Oliva, D., Rekola, L.
Pages: 236-251
Publication date: 1 Mar 2017
Peer-reviewed: Yes

Publication information
Journal: Acta Acustica united with Acustica
Volume: 103
Issue number: 2
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Ratings:
Scopus rating (2016): SJR 0.451 SNIP 0.834 CiteScore 1.12
Scopus rating (2015): SJR 0.617 SNIP 1.093 CiteScore 1.11
Scopus rating (2014): SJR 0.615 SNIP 1.071 CiteScore 0.89
Scopus rating (2013): SJR 0.597 SNIP 1.6 CiteScore 1.05
Scopus rating (2012): SJR 0.602 SNIP 0.963 CiteScore 0.81
Scopus rating (2011): SJR 0.515 SNIP 0.918 CiteScore 0.65
Scopus rating (2010): SJR 0.538 SNIP 0.876
Scopus rating (2009): SJR 0.544 SNIP 0.756
Scopus rating (2008): SJR 0.651 SNIP 0.978
Scopus rating (2007): SJR 0.53 SNIP 0.937
Scopus rating (2006): SJR 0.311 SNIP 0.862
Scopus rating (2005): SJR 0.257 SNIP 0.855
Scopus rating (2004): SJR 0.242 SNIP 0.639
Scopus rating (2003): SJR 0.365 SNIP 0.882
Scopus rating (2002): SJR 0.255 SNIP 0.668
Scopus rating (2001): SJR 0.23 SNIP 0.349
Scopus rating (2000): SJR 0.192 SNIP 0.747
Scopus rating (1999): SJR 0.29 SNIP 1.721
Original language: English
ASJC Scopus subject areas: Acoustics and Ultrasonics
Keywords: acoustics, building acoustics, impact sound insulation, psychoacoustics
DOIs:
10.3813/AAA.919053
Research output: Scientific - peer-review > Article

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

Abstract: state-of-the-art 560 mW output power in continuous-wave operation at room temperature. The maximum CW power varies between 210mW and 660mW when the ambient temperature is changed between 5 and 80 °C. The emission spectrum variation with the bias current is shown in Fig. 2. Preliminary results from tapered RWG-LDs on the other hand show output power up to 2750mW at 10A current with narrow spectrum locked to the grating (not shown).
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.
Development process of novel high-power 750 nm direct emitting VECSELs

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

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

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

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

General information
State: Published
Organisations: Photonics
Authors: Aho, A., Viheriälä, J., Mäkelä, J., Virtanen, H., Ranta, S., Dumitrescu, M., Guina, M.
Publication date: 2017
Peer-reviewed: Unknown
ASJC Scopus subject areas: Physics and Astronomy (miscellaneous)
Keywords: LIDAR, 1550nm , high power, laser diode, DBR laser, DBR, Narrow linewidth
DOIs: 10.1109/CLEOE-EQEC.2017.8086373
Research output: Scientific › Paper, poster or abstract

Ilmaääneneristävyyden round robin -testi 2016

General information
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Organisations: Civil Engineering
Authors: Lietzen, J., Kylliäinen, M.
Pages: 93-98
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Ilmaääneneristävyyden round robin -testissä mukana 19 mittausryhmää

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State: Published
Organisations: Civil Engineering
Authors: Lietzen, J., Kylliäinen, M.
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Publication date: 2017
Peer-reviewed: Unknown

Publication information
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Issue number: 2
ISSN (Print): 0033-913X
Original language: Finnish
Keywords: acoustics, sound insulation, airborne sound insulation
ASJC Scopus subject areas: Acoustics and Ultrasonics
Links:
Research output: Professional › Article

Lasitettujen parvekkeiden ääneneristävyyden suunnitteluhoe

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

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

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

Performace of Dilute Nitride Triple Junction Space Solar Cell Grown by MBE
Dilute nitride arsenide antimonide compounds offer widely tailorable band-gaps, ranging from 0.8 eV to 1.4 eV, for the development of lattice-matched multijunction solar cells with three or more junctions. Here we report on the performance of GaInP/GaAs/GaInNAsSb solar cell grown by molecular beam epitaxy. An efficiency of 27% under AM0 conditions is demonstrated. In addition, the cell was measured at different temperatures. The short circuit current density exhibited a temperature coefficient of 0.006 mA/cm²/°C while the corresponding slope for the open circuit voltage was ~6.8 mV/°C. Further efficiency improvement, up to 32%, is projected by better current balancing and structural optimization.
Performance and lifetime of high-power narrow-linewidth 1180 nm GaInNAs DBR-LDs

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

Plasmonic and photonic resonances of nonlinear metasurfaces

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

General information
State: Published
Organisations: Photonics, Research area: Optics, Research group: Nonlinear Optics, Research group: Nonlinear Optics
Authors: Turquet, L., Kakko, J., Karvonen, L., Huhtio, T., Jiang, H., Kauppinen, E., Lipsanen, H., Bautista, G., Kauranen, M., Zang, X.
Number of pages: 1
Pages: 160
Publication date: 2017
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Research output: Scientific › Paper, poster or abstract

Enhancement of Photocurrent in GaInNAs Solar Cells using Ag/Cu Double-Layer Back Reflector

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

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Scopus rating (2015): SJR 1.085 SNIP 0.983 CiteScore 2.47
Scopus rating (2014): SJR 1.799 SNIP 1.462 CiteScore 3.25
Scopus rating (2013): SJR 2.149 SNIP 1.652 CiteScore 3.77
Scopus rating (2012): SJR 2.554 SNIP 1.754 CiteScore 3.76
Scopus rating (2011): SJR 2.805 SNIP 1.94 CiteScore 4.04
Scopus rating (2010): SJR 2.926 SNIP 1.789
Scopus rating (2009): SJR 2.857 SNIP 1.848
Scopus rating (2008): SJR 2.934 SNIP 1.83
Scopus rating (2007): SJR 3.039 SNIP 1.913
Scopus rating (2006): SJR 3.457 SNIP 2.288
Scopus rating (2005): SJR 3.709 SNIP 2.382
Scopus rating (2004): SJR 3.904 SNIP 2.38
Scopus rating (2003): SJR 3.765 SNIP 2.27
Scopus rating (2002): SJR 3.917 SNIP 2.365
Scopus rating (2001): SJR 4.111 SNIP 2.212
Scopus rating (2000): SJR 4.277 SNIP 2.013
Scopus rating (1999): SJR 4.35 SNIP 2.11
Original language: English
Electronic versions:
Enhancement of photocurrent in GaInNAs solar cells using AgCu double-layer back reflector
DOIs:
10.1063/1.4972850
Links:
Fabrication of Ion-Shaped Anisotropic Nanoparticles and their Orientational Imaging by Second-Harmonic Generation Microscopy

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

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

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

Second-harmonic microscopy of nanorods was based on using linearly and radially polarized beams focused by a high-numerical-aperture objective. This technique allows the transverse and longitudinal field components in the focus to be controlled. This in turn affects the coupling of the incident light to the nanorods with different orientations.

We report the high sensitivity of the second-harmonic response to the orientation of the nanorods for different states of polarization. The experimental results were obtained to be in very good agreement with simulations based on the boundary-element method. Compared with previous reports, our results provide a considerable improvement for understanding the interaction of highly focused beams with anisotropic sub-wavelength structures.
Optically Enhanced GaInNAs Solar Cell

General information
State: Published
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications
Authors: Aho, T. A., Aho, A., Tukiainen, A., Polojärvi, V., Raappana, M., Guina, M.
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Research output: Scientific › Paper, poster or abstract

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.

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ASJC Scopus subject areas: Atomic and Molecular Physics, and Optics
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Bibliographical note
JUFOID=71479
Research output: Scientific - peer-review › Conference contribution

Helsingin keskeisten 1800-luvun konserttitilojen huoneakustiikan mallintaminen

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Recognition of multipolar second-order nonlinearities in thin-film samples

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

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Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Optics, Research group: Nonlinear Optics, Department of Physics
Authors: Koskinen, K., Czaplicki, R., Kaplas, T., Kauranen, M.
Number of pages: 7
Pages: 4972-4978
Publication date: 1 Mar 2016
Peer-reviewed: Yes
Optical amplifiers and lasers based on tapered fiber geometry for power and energy scaling with low signal distortion

We report theoretical and experimental study of tapered double-clad fibers (T-DCF) to be implemented as a gain media in a fiber lasers and amplifiers. We have considered most important properties and features of T-DCF. Various amplifiers and lasers using ytterbium T-DCF are demonstrated.
A 1.5-W frequency doubled semiconductor disk laser tunable over 40 nm at around 745 nm

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

Dilute Nitride Four-Junction Solar Cell

Dilute Nitride Multijunction Cells: Recent progress and Future Outlook
Dilute nitride solar cells fabricated by combined MBE-MOCVD epitaxy

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State: Published
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CPV-12_Guina_MBE-MOCVD_update
Research output: Scientific › Paper, poster or abstract

Fabrication and Second-harmonic Generation Imaging of Oriented Ion-shaped Nanoparticles

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

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 effi-cienies of 29% and 31% at one sun (AM0 and AM1.5G, respectively) and 36–39% under concen-trated 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.

General information
State: Published
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications
Authors: Tukiainen, A., Aho, A., Polojarvi, V., Aho, T., Raappana, M., Isoaho, R., Guina, M.
Publication date: 2016
Peer-reviewed: Unknown
Event: Paper presented at Optics and Photonics days, Tampere, Finland.
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**Increasing the quantum efficiency of GaInNAs solar cells by advanced optical design**

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- **State:** Published
- **Organisations:** Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications
- **Authors:** Aho, T. A., Aho, A., Tukiainen, A., Polojärvi, V., Raappana, M., Guina, M.
- **Publication date:** 2016
- **Peer-reviewed:** Unknown
- **Event:** Paper presented at Optics and Photonics days, Tampere, Finland.

**Lasitetun parvekkeen ääneneristys liikennemelua vastaan**

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

**Publication information**
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- **Issue number:** 2
- **ISSN (Print):** 0788-8147
- **Original language:** English
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- **ASJC Scopus subject areas:** Acoustics and Ultrasonics

**Microwave assisted laser-induced breakdown spectroscopy in ambient conditions**

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

**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

**Plasmonic and photonic resonances in nonlinear optics of metasurfaces**

**General 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
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Event: Paper presented at 19th International Conference on Molecular-Beam Epitaxy, 
Research output: Scientific › Paper, poster or abstract

Temporal Ghost Imaging with Magnification

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

Voltage-driven beam bistability in a reorientational uniaxial dielectric

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

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

**Publication information**
Journal: APL Photonics
Volume: 1
Article number: 011302
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Original language: English
Links: http://scitation.aip.org/content/aip/journal/app/1/1/10.1063/1.4945349

**Bibliographical note**
INT=orc,"Assanto, Gaetano"
SESAM mode-locked Tm:CALGO laser at 2 µm
GaSb-based SESAM is successfully employed for passive mode locking of a Tm³⁺:CaGdAlO₄ laser operating near 2 µm. The pulse duration is around 650 fs at a repetition rate ~100 MHz.

General information
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Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Max Born Institut, Berlin, Germany
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Publication date: 14 Dec 2015
Peer-reviewed: Yes

Publication information
Journal: Optical Materials Express
Volume: 6
Issue number: 1
ISSN (Print): 2159-3930
Ratings:
Scopus rating (2016): CiteScore 2.74 SJR 1.082 SNIP 1.287
Scopus rating (2015): SJR 1.406 SNIP 1.411 CiteScore 3.07
Scopus rating (2014): SJR 1.546 SNIP 1.653 CiteScore 3.17
Scopus rating (2013): SJR 1.761 SNIP 2.378 CiteScore 3.42
Scopus rating (2012): SJR 1.625 SNIP 1.831 CiteScore 2.58
Original language: English
DOIs: 10.1364/OME.6.000131
Research output: Scientific - peer-review › Article

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.

Atomic layer deposited second-order nonlinear optical metamaterial for back-end integration with CMOS-compatible nanophotonic circuitry

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

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

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Optoelectronics Research Centre, Changchun University of Science and Technology, University of Bedfordshire, Xi'an Jiaotong-Liverpool University, DCSSE
Authors: Wang, D., Wang, Z., Yue, Y., Yu, J., Tan, C., Li, D., Qiu, R., Maple, C.
Number of pages: 6
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Scopus rating (2016): SJR 0.307 SNIP 0.703 CiteScore 1.03
Scopus rating (2015): SJR 0.339 SNIP 0.697 CiteScore 0.92
Scopus rating (2014): SJR 0.313 SNIP 0.716 CiteScore 0.85
Scopus rating (2013): SJR 0.287 SNIP 0.894 CiteScore 0.88
Scopus rating (2012): SJR 0.318 SNIP 0.734 CiteScore 0.64
Scopus rating (2011): SJR 0.279 SNIP 0.647 CiteScore 0.6
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.

General information
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Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Optoelectronics Research Centre, Research group: Nanophotonics, Research group: Nonlinear Optics, Research group: Nonlinear Fiber Optics, Frontier Photonics
Authors: Ning, T., Tan, C., Niemi, T., Kauranen, M., Genty, G.
Number of pages: 6
Pages: 30695-30700
Publication date: 1 Nov 2015
Peer-reviewed: Yes

Publication information
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Volume: 23
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ISSN (Print): 1094-4087
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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
Nonlinear competition in nematicon propagation

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

General information
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Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research group: Nonlinear Optics, Frontier Photonics, NooEL–Nonlinear Optics and Optoelectronics Laboratory, University Roma Tre, I-00146 Rome, Italy
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Scopus rating (2015): SJR 2.142 SNIP 1.642 CiteScore 3.53
Scopus rating (2014): SJR 2.497 SNIP 2.056 CiteScore 3.86
Scopus rating (2013): SJR 2.458 SNIP 2.095 CiteScore 3.95
Scopus rating (2012): SJR 2.596 SNIP 1.95 CiteScore 3.52
Scopus rating (2011): SJR 2.518 SNIP 2.475 CiteScore 3.69
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
Rogue Waves of Light

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

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research group: Nonlinear Fiber Optics, Research area: Optics, Frontier Photonics
Authors: Dudley, J. M., Erkintalo, M., Genty, G.
Number of pages: 8
Pages: 34-41
Publication date: 1 Nov 2015
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Issue number: 11
ISSN (Print): 1047-6938
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Scopus rating (2015): SJR 0.355 SNIP 0.7 CiteScore 0.61
Scopus rating (2014): SJR 0.36 SNIP 0.96 CiteScore 0.49
Scopus rating (2013): SJR 0.277 SNIP 0.799 CiteScore 0.43
Scopus rating (2012): SJR 0.306 SNIP 0.846 CiteScore 0.37
Scopus rating (2011): SJR 0.325 SNIP 0.759 CiteScore 0.36
Scopus rating (2010): SJR 0.355 SNIP 0.655
Scopus rating (2009): SJR 0.437 SNIP 0.875
Scopus rating (2008): SJR 0.467 SNIP 0.877
Scopus rating (2007): SJR 0.378 SNIP 0.664
Scopus rating (2006): SJR 0.368 SNIP 1.037
Scopus rating (2005): SJR 0.336 SNIP 1.099
Scopus rating (2004): SJR 0.277 SNIP 0.618
Scopus rating (2003): SJR 0.345 SNIP 0.495
Scopus rating (2002): SJR 0.356 SNIP 0.343
Scopus rating (2001): SJR 0.322 SNIP 0.375
Scopus rating (2000): SJR 0.347 SNIP 0.267
Scopus rating (1999): SJR 0.358 SNIP 0.188
Original language: English
Keywords: Nonlinear optics, fibers, Pulse propagation and temporal solitons
Links:
Source: Bibtex
Source-ID: urn:e083ac1b37b69a1c5c33951510895a72
Research output: Scientific - peer-review › Article
Organic Molecular Films as Light-Emitting and Light-Confining Material in Rolled-Up AlInP Semiconductor Microtube Resonators

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

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, Frontier Photonics, Rose-Hulman Institute of Technology
Authors: Plascak, M., Viheriälä, J., Guina, M., Siahmakoun, A.
Publication date: 22 Oct 2015

Host publication information
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DOIs: 10.1364/FIO.2015.JW2A.18
Research output: Scientific - peer-review › Conference contribution

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

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

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Physics, Research area: Optics, Research group: Nonlinear Optics, Research group: Applied Optics, Frontier Photonics
Authors: Karimi, N., Kunwar, P., Toivonen, J.
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ASJC Scopus subject areas: Physics and Astronomy(all)
DOIs:
10.1364/FIO.2015.FTu5E.4
Links:
Research output: Scientific - peer-review › Conference contribution

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.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research group: Nonlinear Optics, Frontier Photonics, Univ Roma Tre, Roma Tre University, NooEL Nonlinear Opt & OptoElect Lab, Univ Southampton, University of Southampton, Zepler Inst, Tampere Univ Technol, Tampere University of Technology, Dept Phys, Opt Lab
Nonlinear negative refraction in reorientational soft matter
We analyze the propagation of self-trapped optical beams close to the Fréedericksz threshold in nematic liquid crystals. Accounting for power-dependent changes in walk-off due to the all-optical response, we demonstrate that light beams can switch from positive to negative refraction according to the excitation.
We investigate incoherent broadband cavity enhanced absorption spectroscopy using a tailored supercontinuum source. By tailoring the supercontinuum spectrum to match the high reflectivity bandwidth of the mirrors, we achieve an unprecedented spectral brightness of more than 7 dBm/nm at wavelengths where the effective absorption path length in the cavity exceeds 40 km. We demonstrate the potential of the source in spectrally broadband measurement of weak overtone transitions of carbon dioxide and methane in the near-infrared 1590 nm-1700 nm range and evaluate its performance against that of a typical superluminescent diode source. Minimum detectable absorption coefficients (3σ) of 2.2 × 10⁻⁹ cm⁻¹ and 6.2 × 10⁻⁹ cm⁻¹ are obtained with the supercontinuum and the superluminescent diode sources, respectively. We further develop a spectral fitting method based on differential optical absorption spectroscopy to fully and properly account for the combined effect of absorption line saturation and limited spectral resolution of the detection. The method allows to cope with high dynamic range of absorption features typical of real-world multicomponent measurements.
Multiple surface lattice resonances in second-harmonic generation from metasurfaces

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Physics, Research area: Optics, Research group: Nonlinear Optics, Frontier Photonics, Univ Eastern Finland, University of Eastern Finland, Inst Photon
Authors: Kauranen, M., Czaplicki, R., Mäkitalo, J., Laukkanen, J., Lehtolahti, J., Kuittinen, M.
Number of pages: 3
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Editor: Barbuto, M.
ISBN (Electronic): 978-1-4799-7836-6
DOI:
10.1109/MetaMaterials.2015.7342475
Research output: Scientific - peer-review › Conference contribution

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

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Ultrafast and intense lasers, Prokhorov General Physics Institute, Russian Academy of Sciences, Laboratory of Quantum Electronics and Optoelectronics, Ulyanovsk State University
Parity-time-symmetric solitons in trapped Bose-Einstein condensates and the influence of varying complex potentials: A variational approach

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

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research group: Nonlinear Optics, Frontier Photonics, Universidade do Porto, Univ Roma Tre, Roma Tre University, Dept Elect Engn, NooEL, Cochin University of Science and Technology, Centro de Física Do Porto
Authors: Devassy, L., Jisha, C. P., Alberucci, A., Kuriakose, V. C.
Number of pages: 12
Publication date: 19 Aug 2015
Bringing High-Performance GaInNAsSb/GaAs SOAs to True Data Applications

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

General information
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Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Research group: Nanophotonics, Frontier Photonics, Photonics Research Communications Laboratory, National Technological University of Athens
Number of pages: 4
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Publication date: 15 Aug 2015
Peer-reviewed: Yes
Caustics and rogue waves in an optical sea

There are many examples in physics of systems showing rogue wave behaviour, the generation of high amplitude events at low probability. Although initially studied in oceanography, rogue waves have now been seen in many other domains, with particular recent interest in optics. Although most studies in optics have focussed on how nonlinearity can drive rogue wave emergence, purely linear effects have also been shown to induce extreme wave amplitudes. In this paper, we report a detailed experimental study of linear rogue waves in an optical system, using a spatial light modulator to impose random phase structure on a coherent optical field. After free space propagation, different random intensity patterns are generated, including partially-developed speckle, a broadband caustic network, and an intermediate pattern with characteristics of both speckle and caustic structures. Intensity peaks satisfying statistical criteria for rogue waves are seen especially in the case of the caustic network, and are associated with broader spatial spectra. In addition, the electric field statistics of the intermediate pattern shows properties of an optical sea with near-Gaussian statistics in elevation amplitude, and trough-to-crest statistics that are near-Rayleigh distributed but with an extended tail where a number of rogue wave events are observed.
Dual-Mode Multi-Section Lasers with Nanoscale Surface Gratings

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

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

Abstract Orthogonal double-pulse (DP) laser-induced breakdown spectroscopy (LIBS) was performed using reheating and pre-ablative configurations. The ablation pulse power density was varied by two orders of magnitude and the DP experiments were carried out for a wide range of interpulse delays. For both DP-LIBS schemes, the signal enhancement was evaluated with respect to the corresponding single-pulse (SP) LIBS as a function of the interpulse delay. The reheating scheme shows a sharp maximum signal enhancement of up to 200-fold for low ablative power densities (0.4 GW cm⁻²); however, for power densities larger than 10 GW cm⁻² this configuration did not improve the SP outcome. On the other hand, a more uniform signal enhancement of about 4-6 was obtained for the pre-ablative scheme nearly independently of the used ablative power density. In terms of the signal-to-noise ratio (SNR) the pre-ablative scheme shows a monotonic increment with the ablative power density. Whereas the reheating configuration reaches a maximum at 2.2 GW cm⁻², its enhancement effect collapses markedly for fluencies above 10 GW cm⁻².
Authors: Sanginés, R., Contreras, V., Sobral, H., Robledo-Martinez, A.
Number of pages: 7
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Scopus rating (2013): SJR 1.061 SNIP 1.703 CiteScore 3.33
Scopus rating (2012): SJR 1.338 SNIP 1.622 CiteScore 3.16
Scopus rating (2011): SJR 0.942 SNIP 1.441 CiteScore 2.72
Scopus rating (2010): SJR 1.489 SNIP 1.4
Scopus rating (2009): SJR 1.155 SNIP 1.323
Scopus rating (2008): SJR 1.218 SNIP 1.365
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Scopus rating (2006): SJR 1.274 SNIP 1.238
Scopus rating (2005): SJR 1.095 SNIP 1.399
Scopus rating (2004): SJR 1.536 SNIP 1.412
Scopus rating (2003): SJR 0.978 SNIP 1.306
Scopus rating (2002): SJR 1.11 SNIP 1.087
Scopus rating (2001): SJR 1.289 SNIP 0.964
Scopus rating (2000): SJR 1.542 SNIP 1.023
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Original language: English

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Keywords: Double-pulse, Emission enhancement, LIBS
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http://www.scopus.com/inward/record.url?scp=84934759672&partnerID=8YFLogxK (Link to publication in Scopus)
Source: Scopus
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Research output: Scientific - peer-review » Article

**Impact of Axial Profile of the Gain Medium on the Mode Instability in Lasers: Regular Versus Tapered Fibers**
The presented paper describes the new concept for suppression of mode instability in high power fiber lasers and amplifiers based on tapered (i.e. axially non-regular) double-clad few-mode gain architecture.

**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: Filippov, V., Ustimchik, V., Chamorovskiy, Y., Golant, K., Vorotynskii, A., Okhotnikov, O.
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Links:
High repetition rate 1.34 µm Nd:YVO₄ microchip laser Q-switched with GaInNAs SESAM

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

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

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

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

We report 1.55µm DBR-RWG grating design, the fabrication process, and the output characteristics of tapered DBR lasers patterned using novel soft UV-NIL. DBR lasers exhibited CW output power of 400mW and side-mode-suppression-ratio of 45dB.
Second-harmonic generation from thermally-evaporated indium selenide thin films

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Department of Physics, Research group: Nonlinear Optics, Research area: Optics
Authors: Slablab, A., Divya, S., Koskinen, K., Czaplicki, R., Kailasnath, M., Radhakrishnan, P., Kauranen, M.
Pages: CE_12_4
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Source: Bibtex
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Research output: Scientific › Conference contribution

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

General information
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Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research area: Optics, Research group: Applied Optics, Frontier Photonics, Vaisala Oyj
Authors: Contreras, V., Lonnqvist, J., Toivonen, J.
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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
Long-range soliton interactions through gain-absorption depletion and recovery

We report the interpulse dynamics in fiber soliton laser because of depletion and relaxation of gain and absorption. The soliton interaction range is shown to depend largely on the relaxation time of dissipative parameters while the compensation of the dynamical gain and absorption depletion leads to the formation of stationary soliton groups with unequal interpulse distances.
Fluctuations of Hi-Hat Timing and Dynamics in a Virtuoso Drum Track of a Popular Music Recording

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

General information
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Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research group: Quantum Control and Dynamics, Research area: Computational Physics, Department of Physics, Department of Signal Processing, Research group: Audio research group, Computational Science X (CompX), Signal Processing Research Community (SPRC), Regensburg Univ Appl Sci, University of Regensburg, Electroacoust Lab, Harvard Univ, Harvard University, Dept Phys, Max Planck Inst Dynam & Self Org MPI DS Gottingen, Max Planck Society
Authors: Räsänen, E., Pulkkinen, O., Virtanen, T., Zollner, M., Hennig, H.
Number of pages: 16
Publication date: 3 Jun 2015
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Scopus rating (2014): SJR 1.545 SNIP 1.141 CiteScore 3.54
Scopus rating (2013): SJR 1.74 SNIP 1.147 CiteScore 3.94
Scopus rating (2012): SJR 1.945 SNIP 1.142 CiteScore 4.15
Scopus rating (2011): SJR 2.369 SNIP 1.23 CiteScore 4.58
Scopus rating (2010): SJR 2.631 SNIP 1.161
Scopus rating (2009): SJR 2.473 SNIP 0.985
Scopus rating (2008): SJR 2.323 SNIP 0.96
Scopus rating (2007): SJR 1.289 SNIP 0.525
Original language: English
Keywords: LONG-RANGE CORRELATIONS, TIME-SERIES, SENSORIMOTOR SYNCHRONIZATION, RATE-VARIABILITY, 1/F NOISE, GROOVE, PERFORMANCE, HEARTBEAT, RHYTHMS, ORGANIZATION

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

Dual-Mode Behavior in Multi-Section DFB Semiconductor Lasers with Laterally-Coupled Ridge-Waveguide Surface Gratings

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

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

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

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

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

All-bismuth fiber system for femtosecond pulse generation, compression, and energy scaling

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Imaging of alpha emitters in a field environment

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

Spontaneous four-wave mixing in liquid-core fibers: Towards fibered Raman-free correlated photon sources
We experimentally demonstrate, for the first time to our knowledge, the generation of correlated photon pairs in a liquid-core photonic crystal fiber. Moreover, we show that, thanks to the specific Raman properties of liquids, the Raman noise (which is the main limitation of the performance of silica-core fiber-based correlated photon pair sources) is highly reduced. With a demonstrated coincident-to-accidental ratio equal to 63 and a pair generation efficiency of about $10^{-4}$ per pump pulse, this work contributes to the development of high-quality correlated photon pair sources for quantum communications.
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 of 53.5-W Subpicosecond Pulse Source

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 of...
Broadband infrared continuum generation in dispersion shifted tapered fiber

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

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Organisations: Optoelectronics Research Centre, Research group: Ultrafast and intense lasers, Tampere University of Technology, Ulyanovsk State University, Prokhorov General Physics Institute, Russian Academy of Sciences
Authors: Korobko, D. A., Okhotnikov, O. G., Stoliarov, D. A., Sysolyatin, A. A., Zolotovskii, I. O.
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Scopus rating (2014): SJR 1.188 SNIP 1.156 CiteScore 2.09
Scopus rating (2013): SJR 1.354 SNIP 1.281 CiteScore 2.33
Scopus rating (2012): SJR 1.517 SNIP 1.273 CiteScore 2.2
Scopus rating (2011): SJR 1.527 SNIP 1.495 CiteScore 2.33
Scopus rating (2010): SJR 1.47 SNIP 1.356
Scopus rating (2009): SJR 1.763 SNIP 1.59
Scopus rating (2008): SJR 1.645 SNIP 1.33
Scopus rating (2007): SJR 1.737 SNIP 1.29
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.

General information
State: Published
Ministry of Education publication type: G5 Doctoral dissertation (article)
Organisations: Optoelectronics Research Centre, Research group: Ultrafast and intense lasers
Authors: Rantamäki, A.
Number of pages: 85
Publication date: 20 Mar 2015

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

Publication series
Name: Tampere University of Technology. Publication
Publisher: Tampere University of Technology
Volume: 1286
ISSN (Print): 1459-2045
Electronic versions:
Dilute nitride SOAs for high-speed data processing in variable temperature conditions

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

Perfect magnetic mirror and simple perfect absorber in the visible spectrum

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

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

General information
State: Published
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Frontier Photonics, Campus Sescelades, Max Born Institute, Sofia University St. Kliment Ohridski, Física i Cristallografia de Materials i Nanomaterials, Universitat Rovira i Virgili
Number of pages: 6
Publication date: 23 Feb 2015
Peer-reviewed: Yes

Publication information
Journal: Optics Express
Volume: 23
Issue number: 4
ISSN (Print): 1094-4087
Ratings:
Scopus rating (2016): CiteScore 3.48 SJR 1.487 SNIP 1.589
Spatial optical solitons in highly nonlocal media

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

General information

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

Publication information

Journal: Physical Review A
Volume: 91
Article number: 013841
ISSN (Print): 1050-2947
Ratings:
Scopus rating (2016): CiteScore 2.25 SJR 1.281 SNIP 0.852
Scopus rating (2015): SJR 1.451 SNIP 0.903 CiteScore 2.06
Scopus rating (2014): SJR 2.121 SNIP 1.146 CiteScore 2.46
Scopus rating (2013): SJR 2.317 SNIP 1.179 CiteScore 2.86
Scopus rating (2012): SJR 2.515 SNIP 1.239 CiteScore 2.81
Scopus rating (2011): SJR 2.31 SNIP 1.261 CiteScore 2.79
Scopus rating (2010): SJR 2.403 SNIP 1.22
Scopus rating (2009): SJR 2.475 SNIP 1.305
Scopus rating (2008): SJR 2.559 SNIP 1.241
Second-Harmonic Generation from Metal Nanoparticles: Resonance Enhancement versus Particle Geometry

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

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research area: Optics, Research group: Nonlinear Optics, Frontier Photonics, Institute of Photonics, Univ Eastern Finland, University of Eastern Finland, Sch Pharm
Authors: Czaplicki, R., Mäkitalo, J., Siikanen, R., Husu, H., Lehtolahti, J., Kuittinen, M., Kauranen, M.
Number of pages: 5
Pages: 530-534
Publication date: 14 Jan 2015
Peer-reviewed: Yes
Early online date: 18 Dec 2014

Publication information
Journal: Nano Letters
Volume: 15
Issue number: 1
ISSN (Print): 1530-6984
Ratings:
Scopus rating (2016): CiteScore 13.4 SJR 7.983 SNIP 2.881
Scopus rating (2015): SJR 8.62 SNIP 3.353 CiteScore 14.76
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
Circular polarization switching and bistability in an optically injected 1300 nm spin-vertical cavity surface emitting laser

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

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, Frontier Photonics
Authors: Bautista, G. S., Johansson, A., Parappurath, N., Herranen, O., Myllyperkiö, P., Jiang, H., Kauppinen, E., Pettersson, M., Kauranen, M.
Number of pages: 2
Publication date: 2015

Host publication information
Title of host publication: Nonlinear Optics 2015: Kauai, Hawaii United States 26–31 July 2015
Publisher: OSA
Article number: NW1A.5

Publication series
Name: Nonlinear Optics Conference Series
DOIs: 10.1364/NLO.2015.NW1A.5
Research output: Scientific › Conference contribution

Breathers Emergence in Spontaneous Modulation Instability

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Department of Physics, Department of Physics, Research group: Nonlinear Fiber Optics, Research area: Optics
Authors: Toenger, S., Godin, T., Billet, C., Dias, F., Erkintalo, M., Genty, G., Dudley, J. M.
Publication date: 2015

Host publication information
Title of host publication: European Quantum Electronics Conference 2015
Publisher: Optical Society of America (OSA)
Article number: EF_P_25
ISBN (Electronic): 978-1-4673-7475-0
Source: Bibtex
Source-ID: urn:4ae642c11bd3a5e3ed329d3c2860b0a4
Research output: Scientific › Conference contribution

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

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
**Depth-resolved nonlinear imaging with cylindrical vector beams**

**General information**
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Physics, Research area: Optics, Research group: Nonlinear Optics
Authors: Bautista, G., Mäkitalo, J., Dhaka, V., Karvonen, L., Chen, Y., Jiang, H., Huhtio, T., Lipsanen, H., Kauranen, M.
Publication date: 2015

**Host publication information**
Title of host publication: NATO ARW on THz Diagnostics of CBRN effects and Detection of Explosives & CBRN: Proceedings of the NATO ARW on Detection of Explosives and CBRN

**Detailed analysis of laser-induced breakdown spectroscopy of single particles using electrodynamic balance trapping**

**General information**
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Department of Physics, Research area: Optics, Research area: Aerosol Physics, Research group: Applied Optics
Authors: Järvinen, S. T., Saari, S., Keskinen, J., Toivonen, J.
Pages: CH_7_5
Publication date: 2015

**Host publication information**
Title of host publication: Northern Optics & Photonics 2015 (NOP 2015) on 2 – 4 June 2015, Lappeenranta, Finland
Research output: Scientific - peer-review › Conference contribution

**Enhancement mechanisms for second-harmonic generation from metal nanostructures**

**General information**
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Department of Physics, Research area: Optics, Research group: Nonlinear Optics, Univ Eastern Finland, University of Eastern Finland, Inst Photon
Authors: Kauranen, M., Czaplicki, R., Mäkitalo, J., Lehtolahti, J., Koskinen, K., Laukkonen, J., Kuittinen, M.
Publication date: 2015

**Host publication information**
Title of host publication: PROCEEDINGS OF SPIE : Ultrafast Phenomena and Nanophotonics XX
Volume: 9746
ISBN (Electronic): 9781628419818
Research output: Scientific › Conference contribution
Enhancement Mechanisms for Second-order Nonlinear Metamaterials

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

Host publication information
Title of host publication: OSA Nonlinear Metamaterials Incubator
Links:
http://www.osa.org/en-us/nonlinearmetamaterials/ (Meeting www page)
Research output: Professional › Conference contribution

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

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

Host publication information
Title of host publication: 2015 European Conference on Lasers and Electro-Optics - European Quantum Electronics Conference
Publisher: OSA
Article number: CF6_3
ISBN (Electronic): 978-1-4673-7475-0
Links:
Research output: Scientific › Conference contribution

Extreme Nonlinear Signal Amplification
Using the extreme sensitivity of supercontinuum generation to input pulse power fluctuations, we demonstrate experimentally the regeneration and amplification of a weak signal by up to 46 dB.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Physics, Research area: Optics, Research group: Nonlinear Fiber Optics
Authors: Närhi, M., Genty, G., Steinmeyer, G., Sand, J., Orsila, L.
Publication date: 2015

Host publication information
Title of host publication: 2015 European Conference on Lasers and Electro-Optics - European Quantum Electronics Conference
Publisher: OSA
ISBN (Print): 978-1-4673-7475-0
Keywords: supercontinuum, signal amplification
Links:
https://www.osapublishing.org/abstract.cfm?uri=CLEO_Europe-2015-CD_1_2
Research output: Scientific - peer-review › Conference contribution

Fabrication of Fluorescent Silver Nanoclusters-based Micro-Label in Polymers

General information
State: Published
Fibres à cœur liquide pour la génération de paires de photons corrélatés émancipées du bruit Raman

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

Host publication information
Title of host publication: Colloque sur les Lasers et l’Optique Quantique (COLOQ’14)
Article number: P170

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

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

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Ultrafast and intense lasers, Ulyanovsk State University
Authors: Zolotovskii, I. O., Korobko, D. A., Okhotnikov, O. G.
Number of pages: 7
Pages: 628-634
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: Quantum Electronics
Volume: 45
Issue number: 7
ISSN (Print): 1063-7818
Ratings:
Scopus rating (2016): SJR 0.491 SNIP 1.101 CiteScore 1.13
Scopus rating (2015): SJR 0.582 SNIP 1.193 CiteScore 1.07
Scopus rating (2014): SJR 0.531 SNIP 0.927 CiteScore 0.89
Scopus rating (2013): SJR 0.555 SNIP 1.062 CiteScore 0.94
The propagation of N-soliton pulses in an optical fibre with slowly decreasing, shifted anomalous dispersion has been studied experimentally and theoretically. Using a generalised nonlinear Schrodinger equation, we have constructed an adequate numerical model for light propagation in such fibre. Using numerical simulation, we have shown that the use of dispersion-decreasing fibres ensures higher average dispersive radiation intensity and better uniformity of the supercontinuum spectrum. A reduction in the third-order dispersion of such fibres enables supercontinuum generation with a bandwidth exceeding that in homogeneous fibres by several hundred nanometres even in the case of a medium-power subpicosecond source.

**General information**

State: Published  
Ministry of Education publication type: A1 Journal article-refereed  
Organisations: Optoelectronics Research Centre, Research group: Ultrafast and intense lasers, Ulyanovsk State University, Optoelectronics Research Centre, Tampere University of Technology, A. M. Prokhorov General Physics Institute, Russian Academy of Sciences  
Authors: Zolotovskii, I. O., Korobko, D. A., Okhotnikov, O. G., Stolyarov, D. A., Sysolyatin, A. A.  
Number of pages: 9  
Pages: 844-852  
Publication date: 2015  
Peer-reviewed: Yes

**Publication information**

Journal: Quantum Electronics  
Volume: 45  
Issue number: 9  
ISSN (Print): 1063-7818  
Ratings:

- Scopus rating (2016): SJR 0.491 SNIP 1.101 CiteScore 1.13  
- Scopus rating (2015): SJR 0.582 SNIP 1.193 CiteScore 1.07  
- Scopus rating (2014): SJR 0.531 SNIP 0.927 CiteScore 0.89  
- Scopus rating (2013): SJR 0.555 SNIP 1.062 CiteScore 0.94  
- Scopus rating (2012): SJR 0.433 SNIP 0.822 CiteScore 0.69  
- Scopus rating (2011): SJR 0.438 SNIP 0.911 CiteScore 0.7  
- Scopus rating (2010): SJR 0.415 SNIP 0.852  
- Scopus rating (2009): SJR 0.444 SNIP 1.039
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.
Halogen bonding enhances nonlinear optical response in poled supramolecular polymers

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

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research area: Optics, Research group: Nonlinear Optics, Department of Chemistry and Bioengineering, Research group: Supramolecular photochemistry, Frontier Photonics, Tampere Univ Technol, Tampere University of Technology, Dept Phys, Univ Milan, Consiglio Nazionale delle Ricerche (CNR), University of Milan, Inst Mol Sci & Technol, CNR, ISTM, Politecn Milan, Polytechnic University of Milan, NFMLab, DCMIC Giulio Natta, Aalto University
Authors: Virkki, M., Tuominen, O., Forni, A., Saccone, M., Metrangolo, P., Resnati, G., Kauranen, M., Priimägi, A.
Number of pages: 4
Pages: 3003-3006
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: Journal of Materials Chemistry C
Volume: 3
ISSN (Print): 2050-7534
Ratings:
Scopus rating (2016): CiteScore 5.14 SJR 1.806 SNIP 1.28
Scopus rating (2015): SJR 1.751 SNIP 1.577 CiteScore 5.32
Scopus rating (2014): SJR 1.505 SNIP 1.36 CiteScore 4.64
Original language: English
Keywords: FILMS
DOIs: 10.1039/c5tc00484e

Bibliographical note
AUX=orc,"Tuominen, Ossi"
ORG=fys,0.5
ORG=keb,0.5
Source: WOS
Source-ID: 000351601200002
Research output: Scientific - peer-review » Article

Incoherent Broadband Cavity Enhanced Absorption Spectroscopy Using a Supercontinuum Source in the Mid-IR

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

Authors: Amiot, C. G., Aalto, A., Toivonen, J., Genty, G.
Number of pages: 2
Publication date: 2015

Host publication information
Title of host publication: Laser Science 2015 : Proceedings Frontiers in Optics 2015
Article number: JTu4A-80
ISBN (Electronic): 978-1-943580-03-3
DOIs: 10.1364/FIO.2015.JTu4A.80
Source: Bibtex
Source-ID: urn:031789265660f6764692e182884f3d
Research output: Scientific - peer-review » Conference contribution

Incoherent Broadband Cavity Enhanced Absorption Spectroscopy with a Supercontinuum Source

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Physics, Research group: Nonlinear Fiber Optics, Research area: Optics, Research group: Applied Optics
Authors: Amiot, C., Aalto, A., Genty, G., Toivonen, J.
Pages: CH_P_16
Publication date: 2015

Host publication information
Publisher: Optical Society of America
ISBN (Electronic): 978-1-4673-7475-0
Source: Bibtex
Source-ID: urn:c56367a4bf927ab34e30bddeb94639e4
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

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

General information
State: Published
Measurement of the Temporal Coherence of Supercontinuum Light

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

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

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

Microdisk lasers based on GaInNAsSb/GaAsN quantum well active region

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

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Frontier Photonics, St Petersburg Acad Univ, Russian Academy of Sciences, St Petersburg Academic University, Russian Acad Sci, Ioffe Physical Technical Institute, Russian Academy of Sciences, Ioffe Phys Tech Inst, Peter Great St Petersburg Polytech Univ
Number of pages: 4
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: Journal of Physics: Conference Series
Volume: 643
ISSN (Print): 1742-6588
Ratings:
Scopus rating (2016): CiteScore 0.45 SJR 0.24 SNIP 0.383
Scopus rating (2015): SJR 0.24 SNIP 0.373 CiteScore 0.35
Scopus rating (2014): SJR 0.253 SNIP 0.344 CiteScore 0.32
Scopus rating (2013): SJR 0.231 SNIP 0.272 CiteScore 0.25
Scopus rating (2012): SJR 0.28 SNIP 0.354 CiteScore 0.33
Scopus rating (2011): SJR 0.292 SNIP 0.352 CiteScore 0.43
Scopus rating (2010): SJR 0.288 SNIP 0.344
Scopus rating (2009): SJR 0.253 SNIP 0.321
Scopus rating (2008): SJR 0.265 SNIP 0.294
Scopus rating (2007): SJR 0.257 SNIP 0.39
Scopus rating (2006): SJR 0.267 SNIP 0.284
Original language: English
Keywords: EPITAXIAL-GROWTH, GAINNAS, THRESHOLD, GAAS
DOI:
Multi-component gas detection in the mid-IR

General information
State: Published
Organisations: Department of Physics, Research area: Optics, Research group: Nonlinear Fiber Optics, Research group: Applied Optics
Authors: Amiot, C. G., Ryczkowski, P., Aalto, A., Toivonen, J., Genty, G.
Publication date: 2015

Publication information
Publisher: SPIE
Year: 2015
Original language: English
DOIs: 10.1117/2.1201510.006199
Links:
http://spie.org/x116134.xml?highlight=x2406&ArticleID=x116134
Research output: Scientific › Other contribution

Noninstantaneous polarization dynamics in dielectric media
Third-order optical nonlinearities play a vital role for the generation and characterization of ultrashort optical pulses. One particular characterization method is frequency-resolved optical gating, which can be based on a large variety of third-order nonlinear effects. Any of these variants presupposes an instantaneous temporal response, as it is expected off resonance. In this paper we show that resonant excitation of the third harmonic gives rise to surprisingly large decay times, which are on the order of the duration of the shortest oscillator pulses generated to date. To this end, we measured interferometric third-harmonic frequency-resolved optical gating traces in TiO2 and SiO2, corroborating polarization decay times up to 6.5 fs in TiO2. This effect is among the fastest effects observed in ultrafast spectroscopy. Numerical solutions of the time-dependent Schrödinger equation are in excellent agreement with experimental observations. Our work (experiments and simulations) corroborates that a noninstantaneous polarization decay may appear in the presence of a 3-photon resonance. In turn, pulse generation and characterization in the ultraviolet may be severely affected by this previously unreported effect.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre
Number of pages: 7
Pages: 151-157
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: Optica
Volume: 2
Issue number: 2
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
DOIs: 10.1364/OPTICA.2.000151
Research output: Scientific › peer-review › Article
Nonlinear optical activity effects in complex anisotropic three-dimensional media

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

Nonlinear Optics of Metal Nanostructures

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

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

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Research group: Ultrafast and intense lasers, Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Frontier Photonics, Ulyanovsk State University, Fiber Optics Research Center, Russian Academy of Sciences
Authors: Heikkinen, J., Gumenyuk, R., Rantamäki, A., Lyytikäinen, J., Leinonen, T., Zolotovskii, I., Melkumov, M., Dianov, E. M., Okhotnikov, O. G.
Recent progress in wafer-fused VECSELs emitting in the 1310 nm waveband

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

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: Applied Optics, STUK Radiat & Nucl
Safety Author, Commiss European Communities, Joint Res Ctr, Inst Transuranium Elements
Authors: Sand, J., Ihantola, S., Nicholl, A., Hrnecek, E., Toivonen, J., Toivonen, H., Peräjärvi, K.
Publication date: 2015

Host publication information
Title of host publication: The European Conference on Lasers and Electro-Optics 2015
Publisher: Optical Society of America
Article number: CN_2_3
ISBN (Electronic): 978-1-4673-7475-0
Keywords: Radioluminescence, alpha radiation, Optical detection of alpha emitters
Links:
Source: Bibtex
Source-ID: urn:c5e6c13ca1357cdf98039843381a5b5f
Research output: Scientific › Conference contribution

Second-harmonic generation from metasurfaces: More than resonance enhancement
We probe metasurfaces of L- and T-shaped gold nanoparticles by second-harmonic generation. The nonlinear radiation from such samples can be boosted through several mechanisms. Furthermore, for certain geometries, the detuning of the incident field polarization from the resonant direction can enhance the overall second-harmonic response.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Physics, Research area: Optics, Research group: Nonlinear Optics, Department of Physics
Authors: Czaplicki, R., Mäkitalo, J., Siikanen, R., Husu, H., Lehtolahti, J., Kuittinen, M., Kauranen, M.
Number of pages: 2
Pages: 1239-1240
Publication date: 2015

Host publication information
Title of host publication: META‘15, The 6th International Conference on Metamaterials, Photonic Crystals and Plasmonics : Proceedings
Editors: Zouhdi, S., Menon, V. M.
ISBN (Electronic): 978-2-9545460-7-0
Links:
Research output: Scientific - peer-review › Conference contribution

SESAM mode-locked Tm: CALGO laser at 2 μm
GaSb-based SESAM is successfully employed for passive mode locking of a Tm\(^{3+}:\) CaGdAlO\(_4\) laser operating near 2 μm. The pulse duration is around 650 fs at a repetition rate ~100 MHz.

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


Shadow Ghost Imaging in the Time Domain

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

Simulated and Experimental Performance of High Efficiency GaInNAsSb Solar Cells

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

Single micro-particle scattering detection based on Edge Filter Enhanced Self-Mixing Interferometry

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Research area: Optics, Department of Physics, Research group: Applied Optics
Authors: Contreras, V., Lonnqvist, J., Toivonen, J.
Pages: CH_P_11
Publication date: 2015
Single-mode 1180 nm dilute nitride DBR laser for frequency doubling to 590 nm

Soliton enhancement of spontaneous symmetry breaking

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

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 the {111}-facetted sidewalls. Finally, the incorporation of Te is confirmed by Raman spectroscopy.
Temperature coefficients for GaInP/GaAs/GaInNAsSb solar cells

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

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Frontier Photonics
Authors: Aho, A., Isoaho, R., Tukiainen, A., Polojärvi, V., Aho, T., Raappana, M., Guina, M.
Publication date: 2015
Peer-reviewed: Yes
Temporal ghost imaging

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

Host publication information
Title of host publication: 4th Photonics Global Conference
Article number: ICMAT15-A-4307

Bibliographical note
Source-ID: urn:867478ccb8930806f3957c4d46e9ba17
Research output: Scientific - peer-review › Article

Temporal Ghost Imaging

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

Host publication information
Title of host publication: Frontiers in Optics 2015
Publisher: OSA
Article number: FTh4D.4
ISBN (Electronic): 978-1-943580-03-3
DOIs:
10.1364/FIO.2015.FTh4D.4
Source: Bibtex
Source-ID: urn:f90eacbc513a12c9e9c76f77e403df8d
Research output: Scientific › Conference contribution
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 2.38 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=eit,0.5
Research output: Scientific - peer-review » Article

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
Tunable nonlinear effects through focused spatially phase-shaped beams

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

Two-time coherence of pulse trains and the integrated degree of temporal coherence
Vector-field Nonlinear Microscopy

General information
State: Published
Ministry of Education publication type: D3 Professional conference proceedings
Organisations: Department of Physics, Research area: Optics, Research group: Nonlinear Optics
Authors: Kauranen, M., Huttunen, M., Mäkitalo, J., Bautista, G.
Number of pages: 2
Pages: 44-45
Publication date: 2015

Host publication information
Title of host publication: 12th Mediterranean Workshop and Topical Meeting on Novel Optical Materials and Applications
Research output: Professional → Conference contribution
**Yellow-orange semiconductor disk lasers for medical applications**

**General information**
State: Unpublished
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Research group: Ultrafast and intense lasers
Publication date: 2015

**Host publication information**
Title of host publication: Poster in Symposium on Future Prospects for Photonics, November 5-6, 2015, Tampere, Finland

**Bibliographical note**
Research output: Scientific › Conference contribution

**Study of second-harmonic generation from CdS nanostructured thin film**
We investigate the second-order nonlinear optical properties of a nanostructured cadmium sulfide thin film by optical second-harmonic generation. The relative values of the components of the second-order susceptibility tensor are found to be 1, $\chi^{(2)}_{xxz} = 0.14$, $\chi^{(2)}_{zxx} = \text{and} 0.07$.

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

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

**General information**

State: Published

Ministry of Education publication type: A1 Journal article-refereed

Organisations: Research group: Ultrafast and intense lasers, Optoelectronics Research Centre, Frontier Photonics, Ulyanovsk State Univ

Authors: Korobko, D. A., Gumenyuk, R., Zolotovskii, I. O., Okhotnikov, O. G.

Number of pages: 17

Pages: 593-609

Publication date: Dec 2014

Peer-reviewed: Yes

**Publication information**

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Volume: 20

Issue number: 6

ISSN (Print): 1068-5200

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Scopus rating (2016): CiteScore 1.89 SJR 0.649 SNIP 1.129
Scopus rating (2015): SJR 0.841 SNIP 1.21 CiteScore 1.86
Scopus rating (2014): SJR 0.814 SNIP 1.352 CiteScore 1.88
Scopus rating (2013): SJR 0.703 SNIP 1.265 CiteScore 1.84
Scopus rating (2012): SJR 0.864 SNIP 1.517 CiteScore 1.73
Scopus rating (2011): SJR 0.805 SNIP 1.803 CiteScore 1.73
Scopus rating (2010): SJR 0.544 SNIP 0.976
Scopus rating (2009): SJR 0.836 SNIP 1.115
Scopus rating (2008): SJR 0.646 SNIP 1.208
Scopus rating (2007): SJR 0.872 SNIP 1.008
Scopus rating (2006): SJR 1.168 SNIP 2.179
Scopus rating (2005): SJR 1.424 SNIP 1.96
Scopus rating (2004): SJR 1.738 SNIP 2.222
Scopus rating (2003): SJR 1.001 SNIP 1.299
Scopus rating (2002): SJR 1.196 SNIP 1.066
Scopus rating (2001): SJR 1.503 SNIP 1.012
Scopus rating (2000): SJR 1.142 SNIP 0.937
Scopus rating (1999): SJR 1.12 SNIP 0.799

Original language: English

Keywords: Mode-locked fiber laser, Temporal solitons, Soliton dynamics, Nonlinear optics, Bound soliton pair, MODE-LOCKED LASERS, SATURABLE ABSORBER MIRRORS, BOUND SOLITONS, DISSIPATIVE SOLITONS, CAVITY DISPERSION, PULSE GENERATION, STATES, RAINS, PERTURBATIONS, PROPAGATION

ASJC Scopus subject areas: Electronic, Optical and Magnetic Materials, Electrical and Electronic Engineering

DOIs: 10.1016/j.yofte.2014.08.011

**Bibliographical note**

Invited Paper<br/>Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2014-11-11<br/>Publisher name: Academic Press

Source: researchoutputwizard

Source-ID: 759

Research output: Scientific - peer-review › Article

**Nematic liquid crystals: An excellent playground for nonlocal nonlinear light localization in soft matter**

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

**General information**

State: Published

Ministry of Education publication type: A1 Journal article-refereed
Spatial routing with light-induced waveguides in uniaxial nematic liquid crystals

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

General information

State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Frontier Photonics, Warsaw Univ Technol, Warsaw University of Technology, Fac Phys, Opt Div
Authors: Sala, F. A., Karpierz, M. A., Assanto, G.
Number of pages: 10
Publication date: Dec 2014
Peer-reviewed: Yes
**Publication information**
Journal: Journal of Nonlinear Optical Physics and Materials  
Volume: 23  
Issue number: 4  
Article number: 1450047  
ISSN (Print): 0218-8635  
Ratings:  
Scopus rating (2016): CiteScore 0.81 SJR 0.296 SNIP 0.484  
Scopus rating (2015): SJR 0.265 SNIP 0.507 CiteScore 0.67  
Scopus rating (2014): SJR 0.272 SNIP 0.352 CiteScore 0.59  
Scopus rating (2013): SJR 0.299 SNIP 0.359 CiteScore 0.58  
Scopus rating (2012): SJR 0.302 SNIP 0.331 CiteScore 0.55  
Scopus rating (2011): SJR 0.243 SNIP 0.208 CiteScore 0.42  
Scopus rating (2010): SJR 0.354 SNIP 0.382  
Scopus rating (2009): SJR 0.351 SNIP 0.368  
Scopus rating (2008): SJR 0.413 SNIP 0.393  
Scopus rating (2007): SJR 0.283 SNIP 0.415  
Scopus rating (2006): SJR 0.402 SNIP 0.596  
Scopus rating (2005): SJR 0.507 SNIP 0.535  
Scopus rating (2004): SJR 0.546 SNIP 0.485  
Scopus rating (2003): SJR 0.582 SNIP 0.712  
Scopus rating (2002): SJR 0.462 SNIP 0.664  
Scopus rating (2001): SJR 0.597 SNIP 0.856  
Scopus rating (2000): SJR 0.762 SNIP 0.818  
Scopus rating (1999): SJR 0.638 SNIP 0.559  
Original language: English  
Keywords: Liquid crystals, demultiplexing, spatial soliton, nonlinear optics, nematicons, anisotropic crystals, soft matter, beam self-action, SOLITONS, PROPAGATION, BEAMS, REORIENTATION  
DOIs:  
10.1142/S0218863514500477  
Source: WOS  
Source-ID: 000348459800008  
Research output: Scientific - peer-review › Article

**Steering of optical solitary waves by coplanar low power beams in reorientational media**

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

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

**Publication information**
Journal: Journal of Nonlinear Optical Physics and Materials  
Volume: 23  
Issue number: 4  
Article number: 1450045  
ISSN (Print): 0218-8635  
Ratings:  
Scopus rating (2016): CiteScore 0.81 SJR 0.296 SNIP 0.484
Effect of absorption recovery in bismuth-doped silica glass at 1450 nm on soliton grouping in fiber laser

Saturable absorption in bismuth-doped glasses was found to have a noticeable influence on soliton interaction and group formation. This phenomenon, observed in 1450 nm mode-locked bismuth-doped fiber laser, shows the distinct feature of the multiple pulse regime, which appears as a stationary pulse group whose length can be spread over the whole cavity length by variation of the pump power and polarization. Pulse positioning within the ensemble depends on the saturation fluence and the relatively fast recovery dynamics of bismuth fiber.
Microscopic determination of second-order nonlinear optical susceptibility tensors
We demonstrate a microscopy technique that extracts tensorial information about the second-order nonlinear optical susceptibility and hyperpolarizability of molecular materials. Our technique is based on polarization-dependent second-harmonic generation and a genetic algorithm, using which the best possible match with the measured data, and the possible susceptibility tensor components are found. In contrast to existing techniques, which access only the magnitude of the nonlinear response, our technique also provides information about the phase of the tensor components, which is associated with molecular resonances. After verifying the technique using simulated model structures with well-known symmetries, we demonstrate its capabilities using model surface samples consisting of single purple membrane (PM) fragments of bacteriorhodopsin (bR) chromoproteins. Since the supramolecular structures of PM, bR, and photoactive retinal molecules are known, complex-valued tensorial information on the molecular hyperpolarizabilities can also be extracted. Our technique opens new possibilities for obtaining detailed structural information on biomolecular samples with microscopic resolution.

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

Direct laser writing of photostable fluorescent silver nanoclusters in polymer films

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

State: Published

Ministry of Education publication type: A1 Journal article-refereed

Organisations:
- Research group: Nonlinear Optics
- Research area: Optics, Department of Physics, Frontier Photonics

Authors: Bautista, G., Pfisterer, S. G., Huttunen, M. J., Ranjan, S., Kanerva, K., Ikonen, E., Kauranen, M.

Number of pages: 7

Pages: 2230-2236

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Peer-reviewed: Yes

**Publication information**

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Volume: 107

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Scopus rating (2016): SJR 1.946 SNIP 1.018 CiteScore 3.06

Scopus rating (2015): SJR 2.145 SNIP 1.173 CiteScore 3.3

Scopus rating (2014): SJR 2.203 SNIP 1.166 CiteScore 3.33

Scopus rating (2013): SJR 2.229 SNIP 1.165 CiteScore 3.64

Scopus rating (2012): SJR 2.343 SNIP 1.154 CiteScore 3.57

Scopus rating (2011): SJR 2.322 SNIP 1.204 CiteScore 3.75

Scopus rating (2010): SJR 2.646 SNIP 1.303

Scopus rating (2009): SJR 2.953 SNIP 1.361

Scopus rating (2008): SJR 3.222 SNIP 1.416

Scopus rating (2007): SJR 3.119 SNIP 1.422

Scopus rating (2006): SJR 2.807 SNIP 1.416

Scopus rating (2005): SJR 2.659 SNIP 1.403

Scopus rating (2004): SJR 2.494 SNIP 1.491

Scopus rating (2003): SJR 2.617 SNIP 1.428

Scopus rating (2002): SJR 2.508 SNIP 1.45

Scopus rating (2001): SJR 2.428 SNIP 1.386

Scopus rating (2000): SJR 2.603 SNIP 1.395

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

The aim of this thesis is to investigate the advantages of pumping fiber optic oscillators utilizing a special type of lasers – semiconductor disk lasers. Relatively novel semiconductor disk laser technology offers low relative intensity noise levels combined with scalable output power, stable operation and nearly diffraction-limited beam quality valuable for an efficient fiber coupling (70-90%). This pumping technique was applied for optical pumping of fiber lasers. Low-noise fiber Raman amplifier in co-propagation configuration for pump and signal was developed in the 1.3 μm spectral range. A hybrid Raman-bismuth-doped fiber amplifier scheme for an efficient pump light conversion was proposed and demonstrated. Semiconductor disk lasers operating at 1.29 μm and 1.48 μm were used as the pump sources for picosecond Raman fiber lasers at 1.38 and 1.6 μm. The 1.38 μm passively modelocked Raman fiber laser produced 1.97 ps pulses with a ring cavity configuration. The 1.6 μm linear cavity fiber laser with the integrated SESAM produced 2.7 ps output. A picosecond semiconductor disk laser followed by the ytterbium-erbium fiber amplifier offered supercontinuum generation spanning from 1.35 μm to 2 μm with an average power of 3.5 W. By utilizing a 1.15 μm semiconductor disk laser, a pulsed Ho3+-doped fiber lasers for a 2 μm spectral band were demonstrated. 118 nJ pulses at the repetition rate of 170 kHz and central wavelength of 2097 nm were produced by a holmium fiber laser Q-switched by a carbon nanotube saturable absorber. Sub-picosecond holmium-doped fiber laser modelocked with a broadband carbon nanotube saturable absorber and a SESAM were developed. Using the former saturable absorber, ultrashort pulse operation with the duration of ~ 890 fs in the 2030-2100 nm wavelength range was obtained. The results in the presented dissertation demonstrate the potential of the semiconductor disk laser technology for pumping fiber amplifiers and ultrafast lasers.
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
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Name: Optics and Photonics Days

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Oral, Session 6. Ultrafast optics and microscopy
Contribution: organisation=orc,FACT1=1
Portfolio EDEND: 2014-10-24
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Source: researchoutputwizard
Source-ID: 430
Research output: Scientific › Conference contribution

2 micrometer in diameter quantum dots microdisc/microring lasers

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Optoelectronics Research Centre
Authors: Karpov, D., Laukkanen, J., Tommila, J., Scirko, Y., Kryzhanovskaya, N., Zhukov, A., Lipovskii, A.
Number of pages: 1
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Bibliographical note
Contribution: organisation=orc,FACT1=1
Portfolio EDEND: 2014-10-24
Publisher name: Finnish Optical Society
Source: researchoutputwizard
Source-ID: 668
Research output: Scientific › Conference contribution

50-ps Passively Mode-Locked Red Praseodymium Laser

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

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

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

Bibliographical note
Contribution: organisation=orc,FACT1=1
Portfolio EDEND: 2014-12-31
Publisher name: Optical Society of America
Absorption recovery dynamics in 2 um GaSb-based SESAMs

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Paajaste, J., Suomalainen, S., Härkönen, A., Griebner, U., Steinmeyer, G., Guina, M.
Number of pages: 6
Pages: 1-6
Publication date: 2014
Peer-reviewed: Yes

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Issue number: 6
Article number: 065102
ISSN (Print): 0022-3727
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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
Original language: English
DOIs: 10.1088/0022-3727/47/6/065102

Bibliographical note
Contribution: organisation=orc,FACt1=1<br/>Portfolio EDEND: 2014-02-15<br/>Publisher name: Institute of Physics
Publishing IOP
Source: researchoutputwizard
Source-ID: 1204
Research output: Scientific - peer-review › Article

Active optical fiber and method for fabricating an active optical fiber

General information
State: Published
Ministry of Education publication type: H1 Granted patent
Organisations: Former organisation of the author
Authors: Filippov, V., Chamorovskiy, Y., Okhotnikov, O. G., Pessa, M.
Publication date: 2014
Aerosol synthesis of silver-silica nanocomposites for second-order nonlinear optics

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

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

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, Tampere University of Technology, Frontier Photonics, Optoelectronics Research Centre, Tampere University of Technology, Institute of Radio Engineering and Electronics, Russian Academy of Sciences (IRE RAS), Russian Academy of Sciences
Authors: Gumenyuk, R., Filippov, V., Vorotinskii, A., Okhotnikov, O. G., Chamorovskii, Y., Golant, K.
Publication date: 2014

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

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, Tampere University of Technology, Frontier Photonics, Optoelectronics Research Centre, Tampere University of Technology, Institute of Radio Engineering and Electronics, Russian Academy of Sciences (IRE RAS), Russian Academy of Sciences
Authors: Gumenyuk, R., Filippov, V., Vorotinskii, A., Okhotnikov, O. G., Chamorovskii, Y., Golant, K.
Publication date: 2014
Broadband spatiotemporal Gaussian Schell-model pulse trains

**General information**

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

**Publication information**

Journal: Journal of the Optical Society of America A: Optics Image Science and Vision
Volume: 31
Issue number: 3
ISSN (Print): 1084-7529
Ratings:
Scopus rating (2016): CiteScore 1.54 SJR 0.621 SNIP 1.02
Scopus rating (2015): SJR 0.951 SNIP 1.156 CiteScore 1.61
Scopus rating (2014): SJR 0.906 SNIP 1.339 CiteScore 1.72
Scopus rating (2013): SJR 1.04 SNIP 1.336 CiteScore 1.66
Scopus rating (2012): SJR 1.062 SNIP 1.217 CiteScore 1.65
Scopus rating (2011): SJR 1.098 SNIP 1.486 CiteScore 1.82
Scopus rating (2010): SJR 1.254 SNIP 1.578
Scopus rating (2009): SJR 1.394 SNIP 1.614
Scopus rating (2008): SJR 1.469 SNIP 1.526
Scopus rating (2006): SJR 1.562 SNIP 1.959
Scopus rating (2005): SJR 1.361 SNIP 1.806
Scopus rating (2004): SJR 1.381 SNIP 1.832
Scopus rating (2003): SJR 1.436 SNIP 1.742
Scopus rating (2002): SJR 1.383 SNIP 1.654
Scopus rating (2001): SJR 1.496 SNIP 1.661
Scopus rating (2000): SJR 1.279 SNIP 1.236
Scopus rating (1999): SJR 2.159 SNIP 1.225
Original language: English
DOIs: 10.1364/JOSAA.31.000637

**Bibliographical note**

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

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

**General information**

State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre
Authors: Seger, K., Meiser, N., Choi, S., Jung, B., Yeom, D., Rotermund, F., Okhotnikov, O. G., Laurell, F., Pasiskevicius, V.
Number of pages: 7
Pages: 1-7
Publication date: 2014
Controlling modulation instability using an incoherent low amplitude seed

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

Deep levels in 1 eV bandgap dilute nitride antimonide solar cells

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

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: Bendahmane, A., Mussot, A., Szriftgiser, P., Le Rouge, A., Quiquempois, Y., Bigot, L., Genty, G., Dudley, J., Kudlinski, A.
Publication date: 2014

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

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2015-01-22<br/>Publisher name: Optical Society of America (OSA)
Source: researchoutputwizard
Source-ID: 162
Research output: Scientific - peer-review › Conference contribution

Efficiency of dispersive wave generation by cascaded four-wave mixing

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

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

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

Efficiency of dispersive wave generation from a dual-frequency beat signal
Efficient dispersive wave generation by a four-wave mixing cascade

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

Publication information
Journal: Optics Letters
Volume: 39
Issue number: 20
ISSN (Print): 0146-9592
Ratings:
Scopus rating (2016): CiteScore 3.54 SJR 1.864 SNIP 1.658
Scopus rating (2015): SJR 2.142 SNIP 1.642 CiteScore 3.53
Scopus rating (2014): SJR 2.497 SNIP 2.056 CiteScore 3.86
Scopus rating (2013): SJR 2.458 SNIP 2.095 CiteScore 3.95
Scopus rating (2012): SJR 2.596 SNIP 1.95 CiteScore 3.52
Scopus rating (2011): SJR 2.518 SNIP 2.475 CiteScore 3.69
Scopus rating (2010): SJR 2.669 SNIP 2.293
Scopus rating (2009): SJR 3.167 SNIP 2.665
Scopus rating (2008): SJR 3.408 SNIP 2.378
Scopus rating (2007): SJR 3.489 SNIP 2.102
Scopus rating (2006): SJR 3.143 SNIP 2.334
Scopus rating (2005): SJR 3.251 SNIP 2.483
Scopus rating (2004): SJR 3.521 SNIP 2.718
Scopus rating (2003): SJR 3.708 SNIP 2.573
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.39.005850

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2014-12-17<br/>Publisher name: Optical Society of America
Source: researchoutputwizard
Source-ID: 1794
Research output: Scientific - peer-review › Article

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

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Journal: Journal of the Optical Society of America A: Optics Image Science and Vision
Volume: 31
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ISSN (Print): 1084-7529
Ratings:
Scopus rating (2016): CiteScore 1.54 SJR 0.621 SNIP 1.02
Scopus rating (2015): SJR 0.951 SNIP 1.156 CiteScore 1.61
Scopus rating (2014): SJR 0.906 SNIP 1.339 CiteScore 1.72
Scopus rating (2013): SJR 1.04 SNIP 1.336 CiteScore 1.66
Scopus rating (2012): SJR 1.062 SNIP 1.217 CiteScore 1.65
Scopus rating (2011): SJR 1.098 SNIP 1.486 CiteScore 1.82
Scopus rating (2010): SJR 1.254 SNIP 1.578
Scopus rating (2009): SJR 1.394 SNIP 1.614
Scopus rating (2008): SJR 1.469 SNIP 1.526
Scopus rating (2006): SJR 1.562 SNIP 1.959
Scopus rating (2005): SJR 1.361 SNIP 1.806
Scopus rating (2004): SJR 1.381 SNIP 1.832
Scopus rating (2003): SJR 1.436 SNIP 1.742
Scopus rating (2002): SJR 1.383 SNIP 1.654
Scopus rating (2001): SJR 1.496 SNIP 1.661
Scopus rating (2000): SJR 1.279 SNIP 1.236
Scopus rating (1999): SJR 2.159 SNIP 1.225
Original language: English
DOIs: 10.1364/JOSAA.31.002821

Enhancement mechanisms for the nonlinear optical response of metamaterials

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

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

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2014-12-16
Source: researchoutputwizard
Source-ID: 691
Research output: Scientific - peer-review › Conference contribution

Erbium-doped fiber laser mode-locked by aligned single-walled carbon nanotubes

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

Host publication information
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Publisher: Finnish Optical Society
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Name: Optics and Photonics Days

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

Event horizons in nonlinear optics

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

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

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

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

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

Bibliographical note
Contribution: organisation=fys,FACT1=1\nPortfolio EDEND: 2015-01-22\nPublisher name: IEEE Computer Society
Source: researchoutputwizard
Source-ID: 1413
Research output: Scientific - peer-review › Conference contribution

Experimental dynamics of Akhmediev breathers in a dispersion varying optical fiber

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

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

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

Host publication information
Title of host publication: Conference on lasers and electro-optics, CLEO: Science and Innovations, CLEO_SI 2014, San Jose, CA, United States, 8-13 June 2014
Publisher: Optical Society of American (OSA)
Article number: SW11.3
ISBN (Print): 978-155752999-2
DOIs: 10.1364/CLEO_SI.2014.SW11.3

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

Extreme events in resonant radiation from 3-dimensional light bullets

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

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

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

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

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

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

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

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre
Authors: Tolstik, N., Okhotnikov, O. G., Sorokin, E., Sorokina, I. T.
Number of pages: 6
Pages: 1-6
Publication date: 2014
GaSb-based SESAM Mode-Locked Tm,Ho:KLuW Laser at 2060 nm

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

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

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

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2014-12-31<br/>Publisher name: Optical Society of America
Source: researchoutputwizard
Source-ID: 87
Research output: Scientific - peer-review › Conference contribution

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

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

Host publication information
Title of host publication: 16th International Conference on Laser Optics 2014, June 30 - July 4, 2014, St. Petersburg, Russia
Generation of pulse trains with high-repetition-rate in anomalous dispersion decreasing fibers

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

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

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

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

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

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

Publication information
Journal: APPLIED PHYSICS LETTERS
Volume: 105
High-accuracy method for sample positioning in tightly focused nonlinear reflectivity measurement systems for semiconductor saturable absorber mirrors

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

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

Publication series
Name: Optics and Photonics Days

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2014-10-24<br/>Publisher name: Finnish Optical Society
Source: researchoutputwizard
Source-ID: 1199
Research output: Scientific › Conference contribution
High-efficiency 20 W yellow VECSEL

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

Publication information
Journal: Optics Express
Volume: 22
Issue number: 6
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.22.006372

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2014-11-17<br/>Publisher name: Optical Society of America
Source: researchoutputwizard
Source-ID: 652
Research output: Scientific - peer-review › Article

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

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

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

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

Bibliographical note
Oral WA6<br/>Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2014-09-24<br/>Publisher name: IEEE
Source: researchoutputwizard
Source-ID: 1519
Research output: Scientific - peer-review › Conference contribution
High-power flip-chip semiconductor disk laser in the 1.3. um wavelength band

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

Publication information
Journal: Optics Letters
Volume: 39
Issue number: 16
ISSN (Print): 0146-9592
Ratings:
Scopus rating (2016): CiteScore 3.54 SJR 1.864 SNIP 1.658
Scopus rating (2015): SJR 2.142 SNIP 1.642 CiteScore 3.53
Scopus rating (2014): SJR 2.497 SNIP 2.056 CiteScore 3.86
Scopus rating (2013): SJR 2.458 SNIP 2.095 CiteScore 3.95
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.39.004855

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2014-08-31<br/>Publisher name: Optical Society of America
Source: researchoutputwizard
Source-ID: 1351
Research output: Scientific - peer-review › Article

High power 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
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
ISBN (Print): 2-914771-89-4
Research output: Scientific - peer-review › Conference contribution

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

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

Publication information
Journal: Journal of Applied Physics
Instabilities, breathers and rogue waves in optics

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

Publication information
Journal: Nature Photonics
Volume: 8
Issue number: 10
ISSN (Print): 1749-4885

Ratings:
Scopus rating (2016): SJR 15.831 SNIP 9.983 CiteScore 21.32
Scopus rating (2014): SJR 14.556 SNIP 9.949 CiteScore 17.25
Scopus rating (2013): SJR 13.612 SNIP 9.461 CiteScore 16.32
Scopus rating (2012): SJR 13.418 SNIP 8.003 CiteScore 13.46
Scopus rating (2010): SJR 10.754 SNIP 8.328
Scopus rating (2009): SJR 8.577 SNIP 11.176
Instability of structural defects generated by electron irradiation in GaInNAs quantum wells

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Pavelescu, E., Dumitrescu, M., Guina, M.
Number of pages: 3
Pages: 584-586
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Journal of Luminescence
Volume: 154
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.2014.05.042

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2014-11-17<br/>Publisher name: Elsevier BV
Source: researchoutputwizard
Source-ID: 1247
Research output: Scientific - peer-review › Article

Moth eye antireflection coated GaInP/GaAs/GaInNAs solar cell

General information
State: Published
Multipolar nonlinear properties of silicon nitride films

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

Host publication information
Editor: Saarinen, J. J.

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

Multipolar second-harmonic generation from films of chalcogenide glasses

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

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

**General information**

State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Research group: Nonlinear Optics, Research area: Optics, Department of Physics, Frontier Photonics
Authors: Bautista, G., Huttunen, M., Mäkitalo, J., Kauranen, M.
Number of pages: 1
Pages: 1-2
Publication date: 2014

**Host publication information**

Title of host publication: 2014 16th International Conference on Transparent Optical Networks (ICTON), July 6-10, 2014, Graz, Austria
Publisher: IEEE
DOIs:
10.1109/ICTON.2014.6876679

**Bibliographical note**

Contribution: organisation=fys,FACT1=1
Portfolio EDEND: 2014-09-30
Publisher name: IEEE
Source-ID: 154
Research output: Scientific › Conference contribution

Nonlinear microscopy with focused vector fields

**General information**

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

**Host publication information**

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

**Bibliographical note**

Contribution: organisation=fys,FACT1=1
Portfolio EDEND: 2014-12-01
Source-ID: 694
Research output: Scientific › Conference contribution

Nonlinear optics of fiber event horizons

**General information**

State: Published
Ministry of Education publication type: A4 Article in a conference publication
Nonlinear Optics of fibre event horizons

The nonlinear interaction of light in an optical fibre can mimic the physics at an event horizon. This analogue arises when a weak probe wave is unable to pass through an intense soliton, despite propagating at a different velocity. To date, these dynamics have been described in the time domain in terms of a soliton-induced refractive index barrier that modifies the velocity of the probe. Here we complete the physical description of fibre-optic event horizons by presenting a full frequency-domain description in terms of cascaded four-wave mixing between discrete single-frequency fields, and experimentally demonstrate signature frequency shifts using continuous wave lasers. Our description is confirmed by the remarkable agreement with experiments performed in the continuum limit, reached using ultrafast lasers. We anticipate that clarifying the description of fibre event horizons will significantly impact on the description of horizon dynamics and soliton interactions in photonics and other systems.
Optically Pumped Edge-Emitting GaAs-Based Laser With Direct Orange Emission

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

Publication information
Journal: IEEE Photonics Technology Letters
Volume: 26
Issue number: 4
ISSN (Print): 1041-1135
Ratings:
Scopus rating (2016): CiteScore 2.52 SJR 1.018 SNIP 1.279
Scopus rating (2015): SJR 1.263 SNIP 1.327 CiteScore 2.62
Scopus rating (2014): SJR 1.461 SNIP 1.614 CiteScore 2.78
Scopus rating (2013): SJR 1.487 SNIP 1.547 CiteScore 2.95
Scopus rating (2012): SJR 1.623 SNIP 1.706 CiteScore 2.46
Scopus rating (2011): SJR 1.51 SNIP 2.012 CiteScore 2.48
Scopus rating (2010): SJR 1.474 SNIP 1.623
Scopus rating (2009): SJR 1.775 SNIP 1.804
Optical rogue waves in whispering-gallery-mode resonators

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

Publication information
Journal: Physical Review A
Volume: 89
Issue number: 1
Article number: 013835
ISSN (Print): 1050-2947
Ratings:

Scopus rating (2016): CiteScore 2.25 SJR 1.281 SNIP 0.852
Scopus rating (2015): SJR 1.451 SNIP 0.903 CiteScore 2.06
Scopus rating (2014): SJR 2.121 SNIP 1.146 CiteScore 2.46
Scopus rating (2013): SJR 2.317 SNIP 1.179 CiteScore 2.86
Scopus rating (2012): SJR 2.515 SNIP 1.239 CiteScore 2.81
Scopus rating (2011): SJR 2.31 SNIP 1.261 CiteScore 2.79
Scopus rating (2010): SJR 2.403 SNIP 1.22
Scopus rating (2009): SJR 2.475 SNIP 1.305
Scopus rating (2008): SJR 2.559 SNIP 1.241
Scopus rating (2007): SJR 2.618 SNIP 1.259
Scopus rating (2006): SJR 2.342 SNIP 1.257
Scopus rating (2005): SJR 2.017 SNIP 1.286
Scopus rating (2004): SJR 2.168 SNIP 1.1
Scopus rating (2003): SJR 2.05 SNIP 1.078
Scopus rating (2002): SJR 2.037 SNIP 1.191
Scopus rating (2001): SJR 2.204 SNIP 1.521
Scopus rating (2000): SJR 2.494 SNIP 1.33
Scopus rating (1999): SJR 2.696 SNIP 1.366

Original language: English
DOIs:
Optimization strategies for second-order nonlinear metamaterials

We summarize our recent results regarding the control and optimization of the second-order nonlinear response of plasmonic metamaterials. Such materials consist of arrays of metal nanoparticles, where the plasmonic resonances of individual particles depend on the size, shape, and dielectric environment of the particles. The resonances are further influenced by the coupling of the particles through the array. We first show that the second-order response, as determined by second-harmonic generation is significantly enhanced by the state-of-the-art sample quality and the resulting narrow plasmonic resonance lines. We then show that the response can depend on subtle details of the ordering of the particles in the array, with apparently similar orderings resulting in second-harmonic generation responses that differ by a factor of 50. Finally, we show that the response can be enhanced by complementing the second-harmonic active particles with passive elements that have no nonlinear response as such. Our results are important in developing metamaterials with tailorable nonlinear properties.
Polarized third-harmonic generation imaging of two-photon photopolymerized microstructures

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

Host publication information
Editor: Saarinen, J. J.

Quantum Dot Semiconductor Disk Lasers

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

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

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2014-12-31<br/>Publisher name: IEEE
Source: researchoutputwizard
Source-ID: 89
Research output: Scientific › peer-review › Conference contribution

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2014-11-28
Source: researchoutputwizard
Source-ID: 829
Research output: Scientific › Conference contribution

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2014-05-26
Source: researchoutputwizard
Source-ID: 1366
Research output: Scientific › peer-review › Chapter
Radioluminescence yield of alpha particles in air

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

Publication information
Journal: New Journal of Physics
Volume: 16
Article number: 053022
ISSN (Print): 1367-2630
Ratings:
Scopus rating (2016): CiteScore 2.97 SJR 1.788 SNIP 1.031
Scopus rating (2015): SJR 1.938 SNIP 1.047 CiteScore 2.8
Scopus rating (2014): SJR 2.806 SNIP 1.307 CiteScore 2.89
Scopus rating (2013): SJR 2.871 SNIP 1.372 CiteScore 2.77
Scopus rating (2012): SJR 3.352 SNIP 1.533 CiteScore 3.4
Scopus rating (2011): SJR 3.47 SNIP 1.634 CiteScore 3.99
Scopus rating (2010): SJR 3.395 SNIP 1.421
Scopus rating (2009): SJR 3.215 SNIP 1.503
Scopus rating (2008): SJR 2.913 SNIP 1.396
Scopus rating (2007): SJR 2.825 SNIP 1.354
Scopus rating (2006): SJR 2.2 SNIP 1.296
Scopus rating (2005): SJR 1.641 SNIP 1.116
Scopus rating (2004): SJR 1.211 SNIP 1.009
Scopus rating (2003): SJR 1.057 SNIP 0.75
Scopus rating (2002): SJR 0.77 SNIP 0.666
Scopus rating (2001): SJR 1.033 SNIP 0.843
Scopus rating (2000): SJR 1.326 SNIP 1.307
Scopus rating (1999): SJR 0.737 SNIP 0.26
Original language: English
DOIs:
10.1088/1367-2630/16/5/053022

Bibliographical note
Contribution: organisation=fys,FACT1=1
Portfolio EDEND: 2014-09-30
Publisher name: Institute of Physics Publishing Ltd.; Deutsche Physikalische Gesellschaft
Source: researchoutputwizard
Source-ID: 1447
Research output: Scientific - peer-review » Article

Resonant radiation from collapsing light pulses and spatiotemporal light bullets

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

Host publication information
Title of host publication: Laser Science, LS 2014, Tucson, United States, 19-23 October 2014
Rogue wave structures in spontaneous modulation instability

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

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

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

Second-harmonic generation microscopy of vertically aligned semiconductor nanowires

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Research group: Nonlinear Optics, Research area: Optics, Department of Physics
Authors: Bautista, G., Mäkitalo, J., Chen, Y., Dhaka, V., Grasso, M., Huttunen, M., Karvonen, L., Huhtio, T., Lipsanen, H., Kauranen, M.
Number of pages: 1
Pages: 33-33
Publication date: 2014

Host publication information
Editor: Saarinen, J. J.

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2014-11-28
Source: researchoutputwizard
Source-ID: 155
Research output: Scientific › Conference contribution

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.

General information
State: Published
Semiconductor disk laser with a semiconductor dielectric-metal mirror

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

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

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

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2014-09-30<br/>Publisher name: IEEE
Source-ID: 1350
Research output: Scientific - peer-review › Conference contribution
Supercontinuum and solitons, what's up?

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

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

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

Theoretical Studies on Multiphoton Absorption of Ultrashort Laser Pulses in Sapphire

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre
Authors: Arola, E.
Number of pages: 12
Pages: 709-720
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: IEEE journal of quantum electronics
Volume: 50
Issue number: 8
ISSN (Print): 0018-9197
Ratings:
Scopus rating (2016): SJR 0.738 SNIP 1.103 CiteScore 1.74
Scopus rating (2015): SJR 0.966 SNIP 1.218 CiteScore 1.99
Scopus rating (2014): SJR 1.074 SNIP 1.227 CiteScore 1.95
Scopus rating (2013): SJR 1.333 SNIP 1.592 CiteScore 2.53
Scopus rating (2012): SJR 1.361 SNIP 1.577 CiteScore 2.19
Scopus rating (2011): SJR 1.296 SNIP 1.557 CiteScore 2.29
Scopus rating (2010): SJR 1.417 SNIP 1.695
Scopus rating (2009): SJR 1.875 SNIP 1.964
Towards THz-Class Pulse Train Semiconductor Disk Laser

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

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

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

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

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

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Orsila, L., Härkönen, A., Hyyti, J., Guina, M., Steinmeyer, G.
Number of pages: 4
Pages: 4384-4387
Publication date: 2014
Peer-reviewed: Yes
Vector-field nonlinear microscopy of nano-objects

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Research group: Nonlinear Optics, Research area: Optics, Department of Physics
Authors: Kauranen, M., Huttunen, M., Mäkitalo, J., Bautista, G.
Pages: 1-2
Publication date: 2014

Host publication information
Title of host publication: 23rd Congress of the International Commission for Optics: Enlightening the future, 26th-29th August, 2014, Santiago de Compostela, Spain
ISBN (Print): 978-84-697-1027-2
Links:
http://ico23.org/site/web/varios/program.php
http://ico23.org/site/web/ico23_program.pdf

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2014-08-06<br/>Publisher name: Optical Society of America
Source: researchoutputwizard
Source-ID: 1198
Research output: Scientific - peer-review › Article
Wafer-fused VECSELs emitting in the 1310nm waveband

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Frontier Photonics
Number of pages: 8
Pages: 1-8
Publication date: 2014

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

Publication series
Name: SPIE Conference Proceedings
Volume: 8966
ISSN (Print): 0277-786X
DOIs:
10.1117/12.2039692

Bibliographical note
Invited Paper
Contribution: organisation=orc,FACT1=1
Portfolio EDEND: 2014-04-29
Publisher name: SPIE - International Society for Optical Engineering
Source: researchoutputwizard
Source-ID: 1518
Research output: Scientific - peer-review › Conference contribution

Wafer fused, wavelength controlled 1300 nm vertical external cavity surface emitting lasers

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Research group: Ultrafast and intense lasers, École Polytechnique Fédérale de Lausanne, Laboratory of Physics of Nanostructures, CH-1015 Lausanne, Switzerland
Publication date: 2014

Host publication information
Title of host publication: 17th International Conference on Metalorganic Vapor Phase Epitaxy

Bibliographical note
xabstract
Research output: Scientific - peer-review › Conference contribution

1.32 μm mode-locked bismuth-doped fiber laser operating in anomalous and normal dispersion regimes
We demonstrate a 1.32 μm mode-locked bismuth fiber laser operating in both anomalous and normal dispersion regimes. In anomalous dispersion regime, achieved by using 13 nm/cm linearly chirped fiber Bragg grating, the laser exhibits multiple soliton operation with pulse duration of 2.51 ps. With the net normal cavity dispersion, the single-pulse operation with higher power has been obtained by avoiding the limitations generic to conservative soliton systems. (C) 2013 Optical Society of America

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research group: Ultrafast and intense lasers, Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Frontier Photonics, Russian Acad Sci, Russian Academy of Sciences, Fiber Opt Res Ctr
Authors: Gumenyuk, R., Puustinen, J., Shubin, A. V., Bufetov, I. A., Dianov, E. M., Okhotnikov, O. G.
Number of pages: 3
Polarization control of the bound state of a vector soliton
This article demonstrates that the number of pulses in a group of vector bound solitons can be accurately adjusted by polarization control. We could achieve states with up to seven pulses trapped in a group with equally firm pulse separation. The stable relative phase between pulses within the group is manifested as an interference pattern in the soliton spectrum. © 2013 Astro Ltd.
1.56 μm 1 watt single frequency semiconductor disk laser

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Rantamäki, A., Rautiainen, J., Sirbu, A., Mereuta, A., Kapon, E., Okhotnikov, O. G.
Number of pages: 6
Pages: 2355-2360
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Optics Express
Volume: 21
Issue number: 2
ISSN (Print): 1094-4087
Ratings:
Scopus rating (2016): CiteScore 3.48 SJR 1.487 SNIP 1.589
Scopus rating (2015): SJR 1.976 SNIP 1.755 CiteScore 3.78
Scopus rating (2014): SJR 2.349 SNIP 2.166 CiteScore 4.18
Scopus rating (2013): SJR 2.358 SNIP 2.226 CiteScore 4.38
Scopus rating (2012): SJR 2.587 SNIP 2.145 CiteScore 3.85
Scopus rating (2011): SJR 2.579 SNIP 2.606 CiteScore 4.04
Scopus rating (2010): SJR 2.943 SNIP 2.466
Scopus rating (2009): SJR 3.092 SNIP 2.669
Scopus rating (2008): SJR 3.195 SNIP 2.393
Scopus rating (2007): SJR 3.27 SNIP 2.032
Scopus rating (2006): SJR 3.233 SNIP 2.326
160W single-frequency laser based on active tapered double-clad fiber amplifier

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre
Authors: Trikshev, A., Kurkov, A., Tsvetkov, V., Filatova, S., Kerttula, J., Filippov, V., Chamorovskiy, Y., Okhotnikov, O.
Number of pages: 1
Pages: 1-1
Publication date: 2013

Host publication information
Title of host publication: International Conference on Coherent and Nonlinear Optics, International Conference on Lasers, Applications, and Technologies, ICONO/LAT 2013, June 18 - 20, 2013, Moscow, Russia
Place of publication: Moscow, Russia
Publisher: International Laser Center, Moscow State University

Publication series
Name: International Conference on Coherent and Nonlinear Optics, International Conference on Lasers, Applications, and Technologies
Links:

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2013-11-29<br/>Publisher name: International Laser Center, Moscow State University
Source: researchoutputwizard
Source-ID: 3557
Research output: Scientific - peer-review › Conference contribution

160W single-frequency laser based on active tapered double-clad fiber amplifier

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Trikshev, A., Kurkov, A., Tsvetkov, V., Filatova, S., Kerttula, J., Filippov, V., Chamorovskiy, Y., Okhotnikov, O. G.
Number of pages: 1
Pages: 1-1
Publication date: 2013

Host publication information
Title of host publication: 2013 Conference on Lasers and Electro-Optics Europe and International Quantum Electronics Conference, CLEO/EUROPE - IQEC 2013, 12-16 May 2013, Munich, Germany
Place of publication: Piscataway, NJ
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

2-µm Tm:Lu2O3 ceramic disk laser intracavity-pumped by a semiconductor disk laser

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Saarinen, E. J., Vasileva, E., Antipov, O., Penttinen, J., Tavast, M., Leinonen, T., Okhotnikov, O. G.
Number of pages: 7
Pages: 23844-23850
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Optics Express
Volume: 21
Issue number: 20
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
A 160 W single-frequency laser based on an active tapered double-clad fiber amplifier

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Trikshev, A., Kurkov, A., Tsvetkov, V., Filatova, S., Kerttula, J., Filipov, V., Chamorovskiy, Y., Okhotnikov, O.
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Laser Physics Letters
Volume: 10
Issue number: 6
Article number: 065101
ISSN (Print): 1612-2011
Ratings:
Scopus rating (2016): SJR 0.768 SNIP 0.912 CiteScore 1.89
Scopus rating (2015): SJR 1.092 SNIP 1.038 CiteScore 2.06
Scopus rating (2014): SJR 1.475 SNIP 1.383 CiteScore 2.51
Scopus rating (2013): SJR 1.428 SNIP 1.718 CiteScore 3.45
Scopus rating (2012): SJR 2.424 SNIP 2.103 CiteScore 6.49
Scopus rating (2011): SJR 2.065 SNIP 2.433 CiteScore 8.08
Scopus rating (2010): SJR 1.69 SNIP 2.078
Scopus rating (2009): SJR 1.306 SNIP 2.039
Scopus rating (2008): SJR 0.716 SNIP 1.094
Scopus rating (2007): SJR 0.625 SNIP 0.825
Scopus rating (2006): SJR 0.543 SNIP 0.76
Scopus rating (2005): SJR 0.391 SNIP 0.578
Original language: English
DOIs:
10.1088/1612-2011/10/6/065101

Bibliographical note
Julkaisussa: J Kertulla
Contribution: organisation=orc,FACT1=1
Portfolio EDEND: 2013-02-27
Publisher name: Institute of Physics Publishing IOP
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
Authors: Rautiainen, J., Rantamäki, A., Tavast, M., Okhotnikov, O. G.
Number of pages: 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: 3251
Research output: Scientific - peer-review › Conference contribution

Amplification of chirped pulses in inhomogeneous three-level active optical fibers

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre
Authors: Zolotovskii, I., Korobko, D., Okhotnikov, O., Sementsov, D., Sysoliatin, A., Fotiadi, A.
Number of pages: 6
Pages: 260-265
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Optics and Spectroscopy
Volume: 114
Issue number: 2
ISSN (Print): 0030-400X
Ratings:
Scopus rating (2016): SJR 0.331 SNIP 0.659 CiteScore 0.66
Scopus rating (2015): SJR 0.274 SNIP 0.587 CiteScore 0.55
Scopus rating (2014): SJR 0.297 SNIP 0.585 CiteScore 0.55
Scopus rating (2013): SJR 0.288 SNIP 0.608 CiteScore 0.53
Scopus rating (2012): SJR 0.413 SNIP 0.582 CiteScore 0.48
Scopus rating (2011): SJR 0.251 SNIP 0.522 CiteScore 0.38
Scopus rating (2010): SJR 0.249 SNIP 0.457
Scopus rating (2009): SJR 0.215 SNIP 0.326
Scopus rating (2008): SJR 0.204 SNIP 0.188
Scopus rating (2007): SJR 0.2 SNIP 0.234
Scopus rating (2006): SJR 0.284 SNIP 0.548
Scopus rating (2005): SJR 0.244 SNIP 0.507
Scopus rating (2004): SJR 0.337 SNIP 0.629
Carbon nanotube mode-locked optically-pumped semiconductor disk laser

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre
Authors: Seger, K., Meiser, N., Choi, S., Jung, B., Yeom, D., Rotermund, F., Okhotnikov, O., Laurell, F., Pasiskevicius, V.
Number of pages: 8
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Optics Express
Volume: 21
Issue number: 15
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

Bibliographical note
Contribution: organisation=orc,FACT1=1
Portfolio EDEND: 2013-07-29
Publisher name: Optical Society of America
Source: researchoutputwizard
Ceramic Tm:Lu2O3 Disk Laser Pumped with a 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: Saarinen, E. J., Vasileva, E., Antipov, O., Penttinen, J., Tavast, M., Leinonen, T., Okhotnikov, O. G.
Number of pages: 3
Pages: 1-3
Publication date: 2013

Host publication information
Place of publication: Washington, DC
Publisher: Optical Society of America
ISBN (Print): 978-1-55752-982-4

Publication series
Name: Advanced Solid State Lasers
DOIs: 10.1364/ASSL.2013.JTh2A.48

Bibliographical note
JTh2A.48<br/>Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2013-11-29<br/>Publisher name: Optical Society of America
Source: researchoutputwizard
Source-ID: 3321
Research output: Scientific - peer-review › Conference contribution

Compression and Generation of Optical Pulses in Anomalous Dispersion Decreasing Fibers

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre
Authors: Korobko, D., Okhotnikov, O., Sysolyatin, A., Yavtushenko, M.
Number of pages: 2
Pages: 1-2
Publication date: 2013

Host publication information
Title of host publication: International Conference on Coherent and Nonlinear Optics, International Conference on Lasers, Applications, and Technologies, ICONO/LAT 2013, June 18 - 20, 2013, Moscow, Russia
Place of publication: Moscow, Russia
Publisher: International Laser Center, Moscow State University

Publication series
Name: International Conference on Coherent and Nonlinear Optics, International Conference on Lasers, Applications, and Technologies

Bibliographical note
LThC6<br/>Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2013-11-29<br/>Publisher name: International Laser Center, Moscow State University
Source: researchoutputwizard
Source-ID: 2608
Research output: Scientific - peer-review › Conference contribution
Control of the absorption recovery time in GaSb SESAMs

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Paajaste, J., Suomalainen, S., Härkönen, A., Griebner, G., Steinmeyer, G., Guina, M.
Number of pages: 1
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

High power semiconductor disk lasers for 1.3-1.6 μm and 650-800 nm spectral ranges

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Research group: Ultrafast and intense lasers, École Polytechnique Fédérale de Lausanne, Laboratory of Physics of Nanostructures, CH-1015 Lausanne, Switzerland
Authors: Rantamäki, A., Rautiainen, J. T., Lyytikäinen, J., Heikkinen, J. J., Sirbu, A., Mereuta, A., Kapon, E., Okhotnikov, O.
Publication date: 2013

Host publication information
Title of host publication: 2nd European Workshop on VeCSELs, 15 - 17 October, 2013, Montpellier, France
Research output: Scientific - peer-review › Conference contribution

High-repetition-rate pulse generation and compression in dispersion decreasing fibers

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre
Authors: Korobko, D. A., Okhotnikov, O. G., Zolotovskii, I. O.
Number of pages: 10
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Journal of the Optical Society of America B
Volume: 30
Issue number: 9
ISSN (Print): 0740-3224
Ratings:
Scopus rating (2016): CiteScore 1.81 SJR 0.894 SNIP 1.015
Scopus rating (2015): SJR 1.023 SNIP 1.002 CiteScore 1.78
Scopus rating (2014): SJR 1.188 SNIP 1.156 CiteScore 2.09
Scopus rating (2013): SJR 1.354 SNIP 1.281 CiteScore 2.33
Incoherent resonant seeding of modulation instability in optical fiber

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Frontier Photonics
Number of pages: 4
Pages: 5338-5341
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Optics Letters
Volume: 38
Issue number: 24
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
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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.38.005338

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2013-07-29<br/>Publisher name: IEEE
Source: researchoutputwizard
Source-ID: 2202
Research output: Scientific - peer-review › Article
Low Temperature Gold-to-Gold Bonded Semiconductor Disk Laser

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Rantamäki, A., Lindfors, J., Silvennoinen, M., Kontio, J., Tavast, M., Okhotnikov, O. G.
Number of pages: 4
Pages: 1062-1065
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: IEEE Photonics Technology Letters
Volume: 25
Issue number: 11
ISSN (Print): 1041-1135
Ratings:
Scopus rating (2016): CiteScore 2.52 SJR 1.018 SNIP 1.279
Scopus rating (2015): SJR 1.263 SNIP 1.327 CiteScore 2.62
Scopus rating (2014): SJR 1.461 SNIP 1.614 CiteScore 2.78
Scopus rating (2013): SJR 1.487 SNIP 1.547 CiteScore 2.95
Scopus rating (2012): SJR 1.623 SNIP 1.706 CiteScore 2.46
Scopus rating (2011): SJR 1.51 SNIP 2.012 CiteScore 2.48
Scopus rating (2010): SJR 1.474 SNIP 1.623
Scopus rating (2009): SJR 1.775 SNIP 1.804
Mode-locked VECSEL emitting 5 ps pulses at 675 nm

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Ranta, S., Härkönen, A., Leinonen, T., Orsila, L., Lyytikäinen, J., Steinmeyer, G., Guina, M.
Number of pages: 3
Pages: 2289-2291
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Optics Letters
Volume: 38
Issue number: 13
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
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Scopus rating (2004): SJR 3.521 SNIP 2.718
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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

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2013-06-29<br/>Publisher name: IEEE
Source: researchoutputwizard
Source-ID: 3224
Research output: Scientific - peer-review › Article

Original language: English
DOIs:
10.1109/LPT.2013.2258147
Multiple Soliton Control in Fiber Lasers by Active Intensity Modulation

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Gumenyuk, R., Okhotnikov, O. G.
Number of pages: 3
Pages: 454-456
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: IEEE Photonics Technology Letters
Volume: 25
Issue number: 5
ISSN (Print): 1041-1135
Ratings:
Scopus rating (2016): CiteScore 2.52 SJR 1.018 SNIP 1.279
Scopus rating (2015): SJR 1.263 SNIP 1.327 CiteScore 2.62
Scopus rating (2014): SJR 1.461 SNIP 1.614 CiteScore 2.78
Scopus rating (2013): SJR 1.487 SNIP 1.547 CiteScore 2.95
Scopus rating (2012): SJR 1.623 SNIP 1.706 CiteScore 2.46
Scopus rating (2011): SJR 1.51 SNIP 2.012 CiteScore 2.48
Scopus rating (2010): SJR 1.474 SNIP 1.623
Scopus rating (2009): SJR 1.775 SNIP 1.804
Scopus rating (2008): SJR 2.081 SNIP 1.818
Scopus rating (2007): SJR 2.345 SNIP 1.566
Scopus rating (2006): SJR 2.112 SNIP 1.884
Scopus rating (2005): SJR 2.97 SNIP 2.454
Scopus rating (2004): SJR 3.286 SNIP 2.716
Scopus rating (2003): SJR 3.44 SNIP 2.467
Scopus rating (2002): SJR 3.566 SNIP 2.117
Scopus rating (2001): SJR 3.519 SNIP 1.678
Scopus rating (2000): SJR 2.345 SNIP 1.202
Scopus rating (1999): SJR 2.44 SNIP 1.302
Original language: English
DOIs:
10.1109/LPT.2013.2240676

Multiple solitons grouping in fiber lasers by dispersion management and nonlinearity control

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Gumenyuk, R., Okhotnikov, O. G.
Number of pages: 6
Pages: 776-781
Publication date: 2013
Peer-reviewed: Yes

**Publication information**
Journal: Journal of the Optical Society of America B
Volume: 30
Issue number: 4
ISSN (Print): 0740-3224

**Ratings:**

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Original language: English
DOIs:
10.1364/JOSAB.30.000776

**Bibliographical note**
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2013-07-29<br/>Publisher name: Optical Society of America
Source: researchoutputwizard
Source-ID: 2204
Research output: Scientific - peer-review › Article

---

**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:**

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Optical amplifier with tailored dispersion for energy scaling of similaritons
Ordered multilayer silica-metal nanocomposites for second-order nonlinear optics
We use aerosol synthesis to fabricate ordered metal-silica nanocomposites consisting of alternating layers of pure silica and silica nanoparticles decorated with silver nanodots. These multilayer structures preserve the narrow plasmon resonance of the nanodots even for high optical densities and allow second-harmonic generation due to spontaneous symmetry breaking arising from the interfaces between silica and nanoparticle layers. Our concept opens up perspectives for complex structures for advanced optical applications.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Engineering materials science and solutions (EMASS), Frontier Photonics
Authors: Zdanowicz, M., Harra, J., Mäkelä, J. M., Heinonen, E., Ning, T., Kauranen, M., Genty, G.
Number of pages: 5
Pages: 1-5
Publication date: 2013
Peer-reviewed: Yes
Passively mode-locked red VECSEL

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Härkönen, A., Ranta, S., Leinonen, T., Lyytikäinen, J., Guina, M.
Number of pages: 1
Pages: 1-1
Publication date: 2013

Host publication information
Title of host publication: 2013 Conference on Lasers and Electro-Optics Europe and International Quantum Electronics Conference, CLEO/EUROPE - IQEC 2013, 12-16 May 2013, Munich, Germany
Place of publication: Piscataway, NJ
Publisher: IEEE

Publication series
Name: European Conference on Lasers and Electro-Optics and the International Quantum Electronics Conference

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2013-09-29<br/>Publisher name: IEEE
Source-ID: 2241
Research output: Scientific - peer-review › Conference contribution

Passively Mode-Locked Tm:YAG Ceramic Laser at 2 μm

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Frontier Photonics
Number of pages: 3
Publication date: 2013

Host publication information
Title of host publication: International Conference on Advanced Solid State Lasers 2013, October 27 - November 1, 2013, Paris, France
Place of publication: Washington, DC
Publisher: Optical Society of America
ISBN (Print): 978-1-55752-982-4

Publication series
Name: Advanced Solid State Lasers
DOIs:
10.1364/ASSL.2013.AF1A.2

Bibliographical note
Recent progress in wafer-fused VECSELs emitting in the 1310 nm and 1550 nm bands

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Sirbu, A., Caliman, A., Mereuta, A., Pierscinski, K., Rantamäki, A., Lyytikäinen, J., Rautiainen, J., Iakovlev, V., Volet, N., Okhotnikov, O., Kapon, E.
Number of pages: 11
Pages: 1-11
Publication date: 2013

Host publication information
Title of host publication: Vertical External Cavity Surface Emitting Lasers (VECSELs) III, SPIE Photonic West 2013, February 2-7, 2013, San Francisco, CA, USA.
Place of publication: Bellingham, WA, USA
Publisher: SPIE
ISBN (Print): 978-0-8194-9418-4

Publication series
Name: SPIE Conference Proceedings
Volume: 8606
ISSN (Print): 0277-786X
DOIs:
10.1117/12.2002461

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2013-06-29<br/>Publisher name: SPIE
Source: researchoutputwizard
Source-ID: 3431
Research output: Scientific - peer-review › Conference contribution

Semiconductor disk lasers in fiber technology

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre
Authors: Okhotnikov, O. G.
Number of pages: 1
Pages: 1-1
Publication date: 2013

Host publication information
Title of host publication: International Conference on Coherent and Nonlinear Optics, International Conference on Lasers, Applications, and Technologies, ICONO/LAT 2013, June 18 - 20, 2013, Moscow, Russia
Place of publication: Moscow, Russia
Publisher: International Laser Center, Moscow State University

Publication series
Name: International Conference on Coherent and Nonlinear Optics, International Conference on Lasers, Applications, and Technologies
Links:

Bibliographical note
Invited talk<br>Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2013-11-29<br/>Publisher name: International Laser Center, Moscow State University
Source: researchoutputwizard
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/

Bibliographical note
Contribution: organisation=fys,FACT1=0.5<br/>Contribution: organisation=orc,FACT2=0.25<br/>Contribution: organisation=mol,FACT3=0.25<br/>Portfolio EDEND: 2013-09-29
Source: researchoutputwizard
Source-ID: 2245
Research output: Scientific › Conference contribution

Spatiotemporal Rogue Events in Optical Multiple Filamentation

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Department of Physics, Frontier Photonics
Authors: Birkholz, S., Nibbering, E. T., Bree, C., Skupin, S., Demircan, A., Genty, G., Steinmeyer, G.
Number of pages: 5
Pages: 1-5
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Physical Review Letters
Volume: 111
Article number: 243903
ISSN (Print): 1079-7114
Ratings:
Scopus rating (2016): CiteScore 6.33 SJR 3.56 SNIP 2.133
Scopus rating (2015): SJR 3.823 SNIP 2.205 CiteScore 5.76
Scopus rating (2014): SJR 5.027 SNIP 2.646 CiteScore 6.62
Scopus rating (2013): SJR 5.674 SNIP 2.796 CiteScore 7.46
Scopus rating (2012): SJR 6.243 SNIP 2.845 CiteScore 7.19
Scopus rating (2011): SJR 6.252 SNIP 2.886 CiteScore 7.02
Scopus rating (2010): SJR 6.418 SNIP 2.764
Scopus rating (2009): SJR 6.342 SNIP 2.94
Scopus rating (2008): SJR 6.223 SNIP 2.854
Scopus rating (2007): SJR 6.14 SNIP 2.862
Scopus rating (2006): SJR 5.645 SNIP 2.807
Scopus rating (2005): SJR 5.35 SNIP 2.938
Scopus rating (2004): SJR 5.312 SNIP 2.976
Scopus rating (2003): SJR 5.33 SNIP 2.93
Tapered double-clad optical fibers as gain medium for high power lasers and amplifiers

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Ustimchik, V., Chamorovskii, Y., Filippov, V., Kerttula, J.
Number of pages: 3
Pages: 60-62
Publication date: 2013

Host publication information
Title of host publication: 6th International Conference on Advanced Optoelectronics and Lasers, CAOL 2013, 9-13 September, 2013, Sudak, Ukraine
Place of publication: Piscataway, NJ
Publisher: IEEE
ISBN (Print): 978-1-4799-0016-9
DOIs:
10.1109/CAOL.2013.6657527

Bibliographical note
Contribution: organisation=orc,FACT1=1
Portfolio EDEND: 2014-02-15
Publisher name: IEEE
Source: researchoutputwizard
Source-ID: 3605
Research output: Scientific - peer-review › Conference contribution

Cost-effective Lidar Technology for Wind Energy

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Physics, Research area: Optics, Optoelectronics Research Centre, Vaisala Oyj
Authors: Järvinen, S., Toivonen, J., Kerttula, M. J. T., Filippov, V., Okhotnikov, O., Laukkanen, S., Valo, H.
Number of pages: 4
Pages: 187-190
Publication date: 25 Jun 2012

Host publication information
Title of host publication: Reviewed & Revised Papers Presented at the 26th International Laser Radar Conference
Volume: 2
Editors: Papayannis, A., Balis, D., Amiridis, V.
Article number: S1P-29
Research output: Scientific - peer-review › Conference contribution

1 W at 785 nm from a frequency-doubled wafer-fused semiconductor disk laser

General information
State: Published
200 GHz 1 W semiconductor disc laser emitting 800 fs pulses
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
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
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
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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.2012.2204736

Bibliographical note
Contribution: organisation=orc,FACT1=1
Publisher name: Institute of Electrical and Electronics Engineers IEEE
Source: researchoutputwizard
Source-ID: 5155
Research output: Scientific - peer-review » Article
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
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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
Effect of thermal management on the properties of saturable absorber mirrors in high-power mode-locked semiconductor disk lasers

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre
Authors: Rantamäki, A., Lyytikäinen, J., Nikkinen, J., Okhotnikov, O. G.
Pages: 786-789
Publication date: 2011
Peer-reviewed: Yes

Publication information
Journal: Quantum Electronics
Volume: 41
Issue number: 9
ISSN (Print): 1063-7818
Ratings:
Scopus rating (2016): SJR 0.491 SNIP 1.101 CiteScore 1.13
Scopus rating (2015): SJR 0.582 SNIP 1.193 CiteScore 1.07
Scopus rating (2014): SJR 0.531 SNIP 0.927 CiteScore 0.89
Scopus rating (2013): SJR 0.555 SNIP 1.062 CiteScore 0.94
Scopus rating (2012): SJR 0.433 SNIP 0.822 CiteScore 0.69
Scopus rating (2011): SJR 0.438 SNIP 0.911 CiteScore 0.7
Scopus rating (2010): SJR 0.415 SNIP 0.852
Scopus rating (2009): SJR 0.444 SNIP 1.039
Scopus rating (2008): SJR 0.459 SNIP 0.877
Scopus rating (2007): SJR 0.391 SNIP 0.776
Scopus rating (2006): SJR 0.286 SNIP 0.747
Scopus rating (2005): SJR 0.302 SNIP 0.719
Scopus rating (2004): SJR 0.272 SNIP 0.803
Scopus rating (2003): SJR 0.318 SNIP 0.547
Scopus rating (2002): SJR 0.253 SNIP 0.766
Scopus rating (2001): SJR 0.363 SNIP 0.705
Scopus rating (2000): SJR 0.376 SNIP 0.485
Scopus rating (1999): SJR 0.357 SNIP 0.438
Original language: English
DOIs:
10.1070/QE2011v041n09ABEH014658

Bibliographical note
Contribution: organisation=orc,FACT1=1
Source: researchoutputwizard
Source-ID: 7091
Research output: Scientific - peer-review › Article
Low-noise Raman fiber amplifier pumped by semiconductor disk laser

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Chamorovskiy, A., Rautiainen, J., Rantamäki, A., Okhotnikov, O. G.
Pages: 6414-6419
Publication date: 2011
Peer-reviewed: Yes

Publication information
Journal: Optics Express
Volume: 19
Issue number: 7
ISSN (Print): 1094-4087
Ratings:
Scopus rating (2016): CiteScore 3.48 SJR 1.487 SNIP 1.589
Scopus rating (2015): SJR 1.976 SNIP 1.755 CiteScore 3.78
Scopus rating (2014): SJR 2.349 SNIP 2.166 CiteScore 4.18
Scopus rating (2013): SJR 2.358 SNIP 2.226 CiteScore 4.38
Scopus rating (2012): SJR 2.587 SNIP 2.145 CiteScore 3.85
Scopus rating (2011): SJR 2.579 SNIP 2.606 CiteScore 4.04
Scopus rating (2010): SJR 2.943 SNIP 2.466
Scopus rating (2009): SJR 3.092 SNIP 2.669
Scopus rating (2008): SJR 3.195 SNIP 2.393
Scopus rating (2007): SJR 3.27 SNIP 2.032
Scopus rating (2006): SJR 3.233 SNIP 2.326
Scopus rating (2005): SJR 3.334 SNIP 2.379
Scopus rating (2004): SJR 2.833 SNIP 2.499
Scopus rating (2003): SJR 2.688 SNIP 2.193
Scopus rating (2002): SJR 1.547 SNIP 1.673
Scopus rating (2001): SJR 1.442 SNIP 1.39
Scopus rating (2000): SJR 1.246 SNIP 0.714
Scopus rating (1999): SJR 1.381 SNIP 0.838
Original language: English
DOIs:
10.1364/OE.19.006414

Bibliographical note
Contribution: organisation=orc,FACT1=1
Source: researchoutputwizard
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Multiple gain cavity for power scaling in passively mode-locked semiconductor disk laser

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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

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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.
Raman Fiber Oscillators and Amplifiers Pumped by Semiconductor Disk Lasers

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Chamorovskiy, A., Rautiainen, J., Rantamäki, A., Okhotnikov, O. G.
Pages: 1201-1207
Publication date: 2011
Peer-reviewed: Yes

Publication information
Journal: IEEE journal of quantum electronics
Volume: 47
Issue number: 9
ISSN (Print): 0018-9197
Ratings:
Scopus rating (2016): SJR 0.738 SNIP 1.103 CiteScore 1.74
Scopus rating (2015): SJR 0.966 SNIP 1.218 CiteScore 1.99
Scopus rating (2014): SJR 1.074 SNIP 1.227 CiteScore 1.95
Scopus rating (2013): SJR 1.333 SNIP 1.592 CiteScore 2.53
Scopus rating (2012): SJR 1.361 SNIP 1.577 CiteScore 2.19
Scopus rating (2011): SJR 1.296 SNIP 1.557 CiteScore 2.29
Scopus rating (2010): SJR 1.417 SNIP 1.695
Scopus rating (2009): SJR 1.875 SNIP 1.964
Scopus rating (2008): SJR 1.782 SNIP 1.738
Scopus rating (2007): SJR 2.09 SNIP 1.713
Scopus rating (2006): SJR 1.829 SNIP 1.86
Scopus rating (2005): SJR 2.621 SNIP 2.3
Scopus rating (2004): SJR 2.888 SNIP 2.512
Scopus rating (2003): SJR 2.687 SNIP 2.154
Scopus rating (2002): SJR 2.189 SNIP 1.924
Scopus rating (2001): SJR 2.518 SNIP 1.725
Scopus rating (2000): SJR 1.92 SNIP 1.344
Scopus rating (1999): SJR 2.206 SNIP 1.387
Original language: English
DOIs:
10.1109/JQE.2011.2161270

Bibliographical note
SA Project WIT<br/>Contribution: organisation=orc,FACT1=1
Source: researchoutputwizard
Source-ID: 5831
Research output: Scientific - peer-review » Article

The Impact of Thermal Management of Saturable Absorber on the Performance of Mode-Locked Semiconductor Disk Lasers

General information
1.38-μm mode-locked Raman fiber laser pumped by semiconductor disk laser

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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

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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
3 W of 850 nm red emission by frequency doubling of wafer-fused semiconductor disk laser

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre
Authors: Rantamäki, A., Sirbu, A., Mereuta, A., Kapon, E., Okhotnikov, O. G.
Pages: 21645-21650
Publication date: 2010
Peer-reviewed: Yes

Publication information
Journal: Optics Express
Volume: 18
Issue number: 21
ISSN (Print): 1094-4087
Ratings:
Scopus rating (2016): CiteScore 3.48 SJR 1.487 SNIP 1.589
Scopus rating (2015): SJR 1.976 SNIP 1.755 CiteScore 3.78
Scopus rating (2014): SJR 2.349 SNIP 2.166 CiteScore 4.18
Scopus rating (2013): SJR 2.358 SNIP 2.226 CiteScore 4.38
Scopus rating (2012): SJR 2.587 SNIP 2.145 CiteScore 3.85
Scopus rating (2011): SJR 2.579 SNIP 2.606 CiteScore 4.04
Scopus rating (2010): SJR 2.943 SNIP 2.466
Scopus rating (2009): SJR 3.092 SNIP 2.669
Scopus rating (2008): SJR 3.195 SNIP 2.393
Scopus rating (2007): SJR 3.27 SNIP 2.032
Scopus rating (2006): SJR 3.233 SNIP 2.326
Scopus rating (2005): SJR 3.334 SNIP 2.379
Scopus rating (2004): SJR 2.833 SNIP 2.499
Scopus rating (2003): SJR 2.688 SNIP 2.193
Scopus rating (2002): SJR 1.547 SNIP 1.673
Scopus rating (2001): SJR 1.442 SNIP 1.39
Scopus rating (2000): SJR 1.246 SNIP 0.714
Scopus rating (1999): SJR 1.381 SNIP 0.838
Original language: English

Bibliographical note
Contribution: organisation=orc,FACT1=1
Source: researchoutputwizard
Source-ID: 9079
Research output: Scientific - peer-review » Article

Passively mode locked semiconductor disk laser using multiple gain elements

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Optoelectronics Research Centre