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
Organisations: Photonics, Research group: ORC
Authors: Casula, R., Penttinen, J., Kemp, A. J., Guina, M., Hastie, J. E.
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Scopus rating (2009): SJR 3.092 SNIP 2.669
Scopus rating (2008): SJR 3.195 SNIP 2.393
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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
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Research output: Scientific - peer-review › Article

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

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State: Published
Organisations: Photonics
Authors: Penttinen, J., Leinonen, T. P., Rantamäki, A., Korpijärvi, V., Kantola, E., Guina, M.
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High power VECSEL prototype emitting at 625 nm
We demonstrate an OP-VECSEL prototype emitting more than 6W of CW output power at 625 nm. We employ dilute nitride (GaInNAs) quantum wells emitting fundamentally at 1250 nm together with intracavity frequency doubling.

Decreasing Defect-State Density of Al2O3/GaInAs Device Interfaces with InOx Structures
Control of defect densities at insulator/GaInAs interfaces is essential for optimal operation of various devices like transistors and infrared detectors to suppress, for example, nonradiative recombination, Fermi-level pinning, and leakage currents. It is reported that a thin InOx interface layer is useful to limit the formation of these defects by showing effect of InOx on quantum efficiency of Ga0.45In0.55As detector and on photoluminescence of GaAs. A study of the Al2O3/GaAs interface via hard X-ray synchrotron photoelectron spectroscopy reveals chemical structure changes at the interface induced by this beneficial InOx incorporation: the InOx sheet acts as an O diffusion barrier that prevents oxidation of GaAs and concomitant As bond rupture.
**Tuning Localized Surface Plasmon Resonances by Self-Assembly in Multi-Metal Nanostructures**

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

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

**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.
Tunable narrow-linewidth VECSELs for atomic and molecular physics

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Authors: Penttinen, J., Leinonen, T., Burd, S., Guina, M.
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VECSEL: a versatile laser tool for ion trappers

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ASJC Scopus subject areas: Atomic and Molecular Physics, and Optics
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Research output: Scientific › Paper, poster or abstract

Progress in Power Scaling and Wavelength Coverage of VECSELs
The main concepts and recent results underpinning the rapid development of vertical external-cavity surface-emitting lasers (VECSELs) are reviewed. In particular, we focus on developments addressing new wavelength domains and emerging applications.
Pyrolysed cellulose nanofibrils and dandelion pappus in supercapacitor application

Dandelion pappus and wood based nanocellulose fibrils were combined to form films that were subsequently pyrolyzed under low-pressure conditions in a carbon monoxide (CO) rich atmosphere to make supercapacitor electrode material. The electrodes were prepared from these materials and pyrolysed under low-pressure conditions in a carbon monoxide-rich atmosphere. The electrode materials and assembled supercapacitors were electrically and structurally characterized. The assembled six supercapacitors showed specific capacitances per electrode ranging from 1 to 6 F/g and surface resistance of pyrolyzed electrodes ranging from 30 to 170 Ω/□. Finally, equivalent series resistance and leakage current measurements were conducted for three samples, resulting values from 125 to 500 Ω and from 0.5 to 5.5 μA, respectively.
Investigation of the structural anisotropy in a self-assembling glycinate layer on Cu(100) by scanning tunneling microscopy and density functional theory calculations

Self-assembling organic molecule-metal interfaces exhibiting free-electron like (FEL) states offers an attractive bottom-up approach to fabricating materials for molecular electronics. Accomplishing this, however, requires detailed understanding of the fundamental driving mechanisms behind the self-assembly process. For instance, it is still unresolved as to why the adsorption of glycine (\[\text{NH}_2(\text{CH}_2)\text{COOH}\]) on isotropic Cu(100) single crystal surface leads, via deprotonation and self-assembly, to a glycinate [\text{NH}_2(\text{CH}_2)\text{COO}^-] layer that exhibits anisotropic FEL behavior. Here, we report on bias-dependent scanning tunneling microscopy (STM) experiments and density functional theory (DFT) calculations for glycine adsorption on Cu(100) single crystal surface. We find that after physical vapor deposition (PVD) of glycine on Cu(100), glycinate self-assembles into an overlayer exhibiting c(2x4) and p(2x4) symmetries with non-identical adsorption sites. Our findings underscore the intricacy of electrical conductivity in nanomolecular organic overlayers and the critical role the structural anisotropy at molecule-metal interface plays in the fabrication of materials for molecular electronics.
Multi-wavelength mid-IR light source for gas sensing

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Roll-to-roll manufacturing of disposable surface-enhanced Raman scattering (SERS) sensors on paper based substrates

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

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Organisations: Physics, Research area: Aerosol Physics, Research group: Aerosol Synthesis, Photonics, Research group: Nanophotonics, Laboratory of Paper Coating and Converting, Center for Functional Materials, Abo Akademi University, Turku, Center for Functional Materials at Biological Interfaces (FUNMAT), Faculty of Engineering, Hokkai-Gakuen University
Authors: Saarinen, J. J., Valtakari, D., Sänden, S., Haapanen, J., Salminen, T., Mäkelä, J., Uozumi, J.
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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.

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Research output: Scientific - peer-review » Conference contribution

Composition and Bandgap determination of MBE-grown GaInNAsSb

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

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

General information
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Organisations: Optoelectronics Research Centre, Research group: Surface Science, MAX IV Laboratory, Lund University
Authors: Vuori, L., Ali-Löytty, H., Lahtonen, K., Hannula, M., Lehtonen, E., Niu, Y., Valden, M.
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Scopus rating (2014): SJR 0.469 SNIP 0.841 CiteScore 0.92
Scopus rating (2013): SJR 0.493 SNIP 1.194 CiteScore 0.77
Scopus rating (2012): SJR 0.479 SNIP 0.886 CiteScore 0.67
Scopus rating (2011): SJR 0.586 SNIP 1.404 CiteScore 1.03
Scopus rating (2010): SJR 0.707 SNIP 1.387
Scopus rating (2009): SJR 0.912 SNIP 1.573
Scopus rating (2008): SJR 0.793 SNIP 1.056
Scopus rating (2007): SJR 0.983 SNIP 1.199
Scopus rating (2006): SJR 0.89 SNIP 1.229
Scopus rating (2005): SJR 1.104 SNIP 1.421
Novel Concepts for High-efficiency lightweight space solar cells

One of the key issues in the design and development of a satellite Photovoltaic Assembly (PVA) is the trade-off to be made between the available volume located to the PVA, its mass and the total amount of power that the solar panels have to guarantee to the spacecraft. The development of high-efficiency, flexible, lightweight solar cells is therefore instrumental to the design of future satellites providing enhanced missions and services. Based on the consolidated development of GaAs-based single junction and lattice matched triple-junction solar cells, several research efforts are being pursued worldwide to further increase the efficiency and reduce mass. Promising approaches include thin-film technologies such as Inverted Metamorphic and Epitaxial Lift-Off (ELO), and the use of nanostructures or highly mismatched alloys grown by MBE. We propose here an alternative path towards the development of lightweight GaAs-based solar cells with the potential to exceed the Shockley-Queisser (SQ) limit of single junction cells. Our approach is based on the synergistic combination of thin-film design, quantum dots (QDs) absorption, and photonic nanostructures. Challenges and opportunities offered by the use of QDs are discussed. A cost-effective and scalable fabrication process including ELO technology and nanoimprint lithography is outlined. Finally, a proof-of-concept design, based on rigorous electromagnetic and physics-based simulations, is presented. Efficiency higher than 30% and weight reduction close to 90% - owing to the substrate removal - makes the proposed device to rank record power-to-weight ratio, with the potential to become a cost-effective, attractive option for next generation space solar cells.

Performance of Dilute Nitride Triple Junction Space Solar Cell Grown by MBE

Dilute nitride arsenide antimonide compounds offer widely tunable 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.
Enhancement of Photocurrent in GaInNAs Solar Cells using Ag/Cu Double-Layer Back Reflector

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Authors: Aho, T., Aho, A., Tukiainen, A., Polojarvi, V., Salminen, T., Raappana, M., Guina, M.
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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
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Scopus rating (2006): SJR 3.457 SNIP 2.288
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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
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Enhancement of photocurrent in GaInNAs solar cells using AgCu double-layer back reflector

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

VECSEL systems for the generation and manipulation of trapped magnesium ions

VECESL systems for the generation and manipulation of trapped magnesium ions

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

We present a widely scalable, high temperature post-growth annealing method for converting ultra-thin films of TiO2 grown by atomic layer deposition to topographically microstructured titanium silicide (TiSi). The photoemission electron microscopy results reveal that the transformation from TiO2 to TiSi at 950 °C proceeds via island formation. Inside the islands, TiO2 reduction and Si diffusion play important roles in the formation of the highly topographically microstructured TiSi interface with laterally nonuniform barrier height contact. This is advantageous for efficient charge transfer in Si-based heterostructures for photovoltaic and photoelectrochemical applications.
Optically Enhanced GaInNAs Solar Cell

General information
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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

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

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High-Power Tapered Distributed Bragg Reflector Laser Diodes Emitting at 1550 nm

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

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

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

High-resolution x-ray diffraction and photoluminescence study of high-quality self-catalyzed GaAs nanowires

General information
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Research output: Scientific › Paper, poster or abstract

Exact modeling of finite temperature and quantum delocalization effects on reliability of quantum-dot cellular automata

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

General information
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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
Color Bricks: Building Highly Organized and Strongly Absorbing Multicomponent Arrays of Terpyridyl Perylenes on Metal Oxide Surfaces

Terpyridine-substituted perylenes containing cyclic anhydrides in the peri position were synthesized. The anhydride group served as an anchor for assembly of the terpyridyl-crowned chromophores as monomolecular layers on metal oxide surfaces. Further coordination with Zn2+ ions allowed for layer-by-layer formation of supramolecular assemblies of perylene imides on the solid substrates. With properly selected anchor and linker molecules it was possible to build high quality structures of greater than ten successive layers by a simple and straightforward procedure. The prepared films were stable and had a broad spectral coverage and high absorbance. To demonstrate their potential use, the synthesized dyes were employed in solid-state dye-sensitized solar cells, and electron injection from the perylene antennas to titanium dioxide was observed.

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Scopus rating (2013): SJR 2.604 SNIP 1.239 CiteScore 5.68
Scopus rating (2012): SJR 2.884 SNIP 1.294 CiteScore 5.55
Scopus rating (2011): SJR 2.726 SNIP 1.336 CiteScore 5.46
Scopus rating (2010): SJR 2.527 SNIP 1.292
Scopus rating (2009): SJR 2.499 SNIP 1.365
Scopus rating (2008): SJR 2.887 SNIP 1.407
Scopus rating (2007): SJR 3.233 SNIP 1.532
Scopus rating (2006): SJR 2.911 SNIP 1.505
Scopus rating (2005): SJR 2.62 SNIP 1.454
Scopus rating (2004): SJR 2.32 SNIP 1.472
This paper reports the DBR-RWG surface grating design, the fabrication process, and the output characteristics of tapered DBR laser diodes for applications such as LIDAR and range finding that require eye-safe high-power single-mode coherent light sources. The regrowth-free AlGaInAs/InP DBR lasers exhibited a CW output power as high as 560 mW in single-mode operation at room temperature. At maximum output power the SMSR was 38 dB. By changing the length of the tapered section from 0.5 mm to 4.0 mm, the maximum CW power could be scaled from 125 mW to 560 mW at room temperature.

**Dilute Nitride Four-Junction Solar Cell**

**Dilute Nitride Multijunction Cells: Recent progress and Future Outlook**

**General information**
Dilute nitride solar cells fabricated by combined MBE-MOCVD epitaxy

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

Electrical isolation of dilute nitride solar cells by wet etching

General information
State: Published
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications
Publication date: 2016
Peer-reviewed: Unknown
Event: Paper presented at Optics and Photonics days, Tampere, Finland.
Research output: Scientific › Paper, poster or abstract

Electrical isolation of high-efficiency dilute nitride multijunction solar cells

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications
Authors: Raappana, M., Polojärvi, V., Aho, T., Aho, A., Tukiainen, A., Hytönen, L., Isoaho, R., Guina, M.
Publication date: 2016

Host publication information
Title of host publication: Physics days 2016 : Proceedings of the 50th annual conference of the Finnish Physical Society
Place of publication: Oulu
Publisher: Finnish Physical Society

Bibliographical note
INT=orc,"Hytönen, Lauri"
Research output: Scientific › Conference contribution

HCl-based wet etching of III-V dilute nitride materials for multijunction solar cells

General information
State: Published
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications
Publication date: 2016
Peer-reviewed: Unknown
Research output: Scientific › Paper, poster or abstract

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

High-efficiency III-V solar cells: From drawing board to real devices

The record solar cell conversion efficiency of 46% at concentrated sunlight has been demonstrated by direct bonding technique [1]. Regardless of the high efficiencies obtained using the direct wafer bonding technique, the conventional monolithic approach used in commercial solar cell production has several benefits, including production technology and cost-related factors. And yet, there is a high unused potential, particularly in new materials that can be grown lattice-matched onto GaAs or Ge substrates. For example, by utilizing dilute nitride materials in multijunction solar cell structures with more than three junctions and by carefully optimizing structural elements and manufacturing technology, efficiencies exceeding 50% is a realistic target [2].

Here we review our theoretical and experimental work carried out on development of various parts of high-efficiency multijunction solar cells based on GaInNAsSb-based materials, i.e., dilute nitrides. First of all, we have developed a molecular beam epitaxy process for GaInNAsSb subjunction 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, Essential 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 subjunctions based on conventional III-V materials such as GaInP and GaAs to be integrated with the dilute nitride sub-junction. Thirdly, we have also extracted important material specific physical parameters such as carrier lifetimes, mobilities and concentrations for dilute nitrides by matching the simulations to experimental solar cell device characteristics [3]. The extracted parameters are used for refining the simulation models which provide deeper understanding of the device physics. The work done so far has led to a rapid increase in conversion efficiency of our GaInP/GaAs/GaInNAsSb triple-junction solar cells – at a pace of ~5 %/points/year since 2012. High-efficiency solar cells with efficiencies of 29% and 31% at one sun (AM0 and AM1.5G, respectively) and 36–39% under concentrated sunlight (at ~70 suns) have already been demonstrated [4,5]. Additionally, the effects of various optical and structural design elements related to fabrication of real III-V multijunction solar cells will be critically reviewed. Especially, we will concentrate on the pros and cons of backside reflector structure architectures – including various planar reflector types and Lambertian scatterers – and nanostructured antireflection coatings [6] which are currently widely employed for solar cell photon management. The consequences of adding such elements to the fabrication process and impact on improving the conversion efficiency towards >50% efficiency are assessed.
Increasing the quantum efficiency of GaInNAs solar cells by advanced optical design

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

Photoluminescence properties of novel GaAsBi compounds fabricated by molecular beam epitaxy

Site-controlled InAs Quantum Dots Coupled to Surface Plasmons
Site-controlled InAs Quantum Dots for Plasmonics

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

Towards material excellence: Evaluation of Tekes' programmes on materials

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

A survey of printable piezoelectric sensors

Availability of solution-processable piezoelectric sensor and electrode materials enable low-cost and high-throughput fabrication of fully printable piezoelectric sensors. Results obtained with piezoelectric polymer (polyvinylidenefluoride, PVDF), cellulose nanofibril (CNF) and cellulose nanocrystal (CNC) films as sensor materials are presented here. These sensor materials can be processed in solution and used in combination with printed electrodes to obtain full printability of the sensors. A commercial PVDF film and in-house fabricated CNF and CNC film are used as sensor materials. In addition, conducting polymer, graphene and carbon nanotube (CNT) based inks are used as solution-processable electrode materials in the sensors, whereas conventional metallic electrodes are used as reference electrode material. The sensor operation of the fabricated sensors is evaluated through piezoelectric sensitivity measurements. The sensor sensitivity measurements revealed mean sensitivities from 2 pC/N to 42 pC/N in transverse direction, depending on set of the sensor and electrode materials used.
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.

Observation of unusual metal-semiconductor interaction and metal-induced gap states at an oxide-semiconductor interface: The case of epitaxial BaO/Ge(100) junction

Oxidation of semiconductor surfaces is known to cause defect states at oxide-semiconductor interfaces of various devices. In contrast, effects of the semiconductor interaction with non-oxygen elements at such junctions are still unclear. We present evidence for the interrelationship between a metal (non-oxygen)-semiconductor reaction and formation of the band-gap defect states at a buried oxide-semiconductor interface by investigating well-defined epitaxial BaO/Ge(100) junctions with high-resolution synchrotron-radiation photoelectron spectroscopy. The states that arise from the Ba-Ge...
interaction lead to Fermi-level pinning at 0.40eV above the valence band maximum, while the defect-free BaO/Ge(100) interface has a flat band structure.

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Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Frontier Photonics, Department of Physics and Astronomy, University of Turku, Russian Academy of Sciences, University of Turku, Turun Yliopisto/Turun Biomateriaalikeskus
Publication date: 20 Oct 2015
Peer-reviewed: Yes

**Publication information**

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Scopus rating (2016): CiteScore 3.16 SJR 1.939 SNIP 1
Scopus rating (2015): SJR 1.943 SNIP 1.008 CiteScore 2.8
Scopus rating (2014): SJR 2.656 SNIP 1.302 CiteScore 3.3
Scopus rating (2013): SJR 2.804 SNIP 1.348 CiteScore 3.55
Scopus rating (2012): SJR 3.159 SNIP 1.397 CiteScore 3.57
Scopus rating (2011): SJR 3.306 SNIP 1.433 CiteScore 3.61
Scopus rating (2010): SJR 3.303 SNIP 1.45
Scopus rating (2009): SJR 3.116 SNIP 1.467
Scopus rating (2008): SJR 2.949 SNIP 1.525
Scopus rating (2007): SJR 2.925 SNIP 1.609
Scopus rating (2006): SJR 2.799 SNIP 1.56
Scopus rating (2005): SJR 2.748 SNIP 1.587
Scopus rating (2004): SJR 2.718 SNIP 1.583
Scopus rating (2003): SJR 2.71 SNIP 1.512
Scopus rating (2002): SJR 2.782 SNIP 1.704
Scopus rating (2001): SJR 2.968 SNIP 1.648
Scopus rating (2000): SJR 2.979 SNIP 1.629
Scopus rating (1999): SJR 3.077 SNIP 1.588
Original language: English
ASJC Scopus subject areas: Condensed Matter Physics, Electronic, Optical and Magnetic Materials
DOIs:
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http://www.scopus.com/inward/record.url?scp=84944790567&partnerID=8YFLogxK (Link to publication in Scopus)
Source: Scopus
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Research output: Scientific - peer-review › Article

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.
Detecting lateral composition modulation in dilute Ga(As,Bi) epilayers

The ability to characterize a structure into the finest details in a quantitative manner is a key issue to understanding and controlling nanoscale phase separation in novel nanomaterials. In this work, we consider the detectability of lateral composition modulation (LCM), a type of nanoscale phase separation in GaAs$_{1-x}$Bi$_x$ epilayers, by x-ray diffraction (XRD). We show that the satellite peaks due to LCM are hardly detectable in reasonable time with a lab x-ray diffractometer for GaAs$_{1-x}$Bi$_x$ samples with an average $x$ up to 25% and relative modulation up to 50%. This is in contrast to LCM reported in other III-V combinations, where the intensity of the satellite peak is relatively high and can be easily detected. Our theoretical considerations are complemented experimentally using highly brilliant synchrotron radiation. The results are in good agreement with the predictions. This work provides a guideline for the systematic characterization of LCM in zincblende III-V semiconductor epilayers and points to the critical role of quantitative characterization of nanoscale phase separation.
Enhanced photoactive and photoelectrochemical properties of TiO2 sol-gel coated steel by the application of SiO2 intermediate layer

Photocatalysis is a promising solution for purifying air and water from pollutants, yet more efficient photocatalytic materials are needed. A new approach is proposed in this paper for enhancing the photoactive and photoelectrical properties of anatase TiO2 films by applying an intermediate SiO2 film between the TiO2 film and the stainless steel substrate. TiO2 and SiO2 coatings are synthesized by a sol-gel method and the thickness of TiO2 film is varied in order to obtain improved understanding on the role of thickness in photocatalytic and electrochemical performance. The obtained coatings are systematically characterized in terms of microstructure using such techniques as field-emission scanning electron microscopy (FE-SEM), Raman spectroscopy and X-ray diffraction (XRD), that demonstrate, e.g., the anatase phase structure of the TiO2 films. The enhanced photocatalytic properties of SiO2/TiO2 coatings as compared to TiO2 films are verified using methylene blue (MB) discoloration tests, while the improved photoelectrochemical properties are shown by potentiodynamic i-V scans, open circuit potential (OCP) monitoring and electrochemical impedance spectroscopy (EIS). We attribute the beneficial effect of the intermediate SiO2 film on the photocatalytic and photoelectrochemical performance to the high electrical resistance of the SiO2 that imposes a high-energy barrier for electron transfer and, therefore, (partly) insulates the TiO2 film from the substrate and acts as a capacitor for photo-generated electrons under illumination. The presented results show an effective way of enhancing the photocatalytic performance of anatase TiO2 films.

General information
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Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Materials Science, Research group: Ceramic materials, Optoelectronics Research Centre, Research group: Nanophotonics, Research group: Surface Engineering, Research group: Materials Characterization, Engineering materials science and solutions (EMASS), Frontier Photonics, Optoelectronics Research Centre, Tampere University of Technology, VTT Technical Research Centre of Finland
Number of pages: 11
Pages: 533-543
Publication date: 1 Sep 2015
Peer-reviewed: Yes
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.
Unintentional boron contamination of MBE-grown GaInP/AlGaNp quantum wells

The effects of unintentional boron contamination on optical properties of GaInP/AlGaNp quantum well structures grown by molecular beam epitaxy (MBE) are reported. Photoluminescence and secondary-ion mass spectrometry (SIMS) measurements revealed that the optical activity of boron-contaminated quantum wells is heavily affected by the amount of boron in GaInP/AlGaNp heterostructures. The boron concentration was found to increase when cracking temperature of the phosphorus source was increased. Boron incorporation was enhanced also when aluminum was present in the material.

General information

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Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Frontier Photonics, VTT Technical Research Centre of Finland
Authors: Tukiainen, A., Likonen, J., Toikkanen, L., Leinonen, T.
Pages: 60-63
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Journal: Journal of Crystal Growth
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Ratings:
Scopus rating (2016): SJR 0.735 SNIP 1.175 CiteScore 1.69
Scopus rating (2015): SJR 0.716 SNIP 1.174 CiteScore 1.63
Scopus rating (2014): SJR 0.795 SNIP 1.184 CiteScore 1.69
Scopus rating (2013): SJR 0.831 SNIP 1.221 CiteScore 1.78
Scopus rating (2012): SJR 0.956 SNIP 1.246 CiteScore 1.68
Effects of thinning and heating for TiO2/AlInP junctions

TiO2/AlInP junctions are used to construct the antireflection coatings for solar cells and to passivate III-V nanostructure surfaces. The thickness of AlInP epilayer affects light absorption and appropriate Al composition determining further the energy barrier for carriers. We report on reducing the AlInP thickness by dry etching down to 10 nm without introducing harmful defect states at TiO2/AlInP interface and AlInP/GaInP interface below, according to photoluminescence. Synchrotron-radiation photoelectron spectroscopy reveals that increased oxidation of phosphorus is not harmful to TiO2/AlInP and that post heating of the material enhances AlInP oxidation and group III element segregation resulting in decreased material homogeneity.

General information
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Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Frontier Photonics, Department of Physics and Astronomy, University of Turku, University of Turku
Number of pages: 4
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Publication Information
Journal: Journal of Electron Spectroscopy and Related Phenomena
Volume: 205
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Scopus rating (2011): SJR 0.96 SNIP 1.425 CiteScore 1.89
Scopus rating (2010): SJR 1.163 SNIP 1.206
Scopus rating (2009): SJR 1.068 SNIP 1.202
Scopus rating (2008): SJR 1.161 SNIP 1.236
Scopus rating (2007): SJR 1.237 SNIP 1.32
Scopus rating (2006): SJR 1.001 SNIP 1.211
Scopus rating (2005): SJR 1.105 SNIP 1.403
Scopus rating (2004): SJR 1.211 SNIP 1.292
Scopus rating (2003): SJR 0.956 SNIP 1.11
Scopus rating (2002): SJR 1.16 SNIP 1.262
Scopus rating (2001): SJR 1.108 SNIP 1.067
Scopus rating (2000): SJR 1.044 SNIP 1.045
Scopus rating (1999): SJR 1.404 SNIP 1.003

Original language: English
ASJC Scopus subject areas: Condensed Matter Physics, Materials Chemistry, Inorganic Chemistry
DOIs: 10.1016/j.jcrysgro.2015.02.048
Bringing High-Performance GaInNAsSb/GaAs SOAs to True Data Applications

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

General information
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Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Research group: Nanophotonics, Frontier Photonics, Photonics Research Communications Laboratory, National Technological University of Athens
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Publication date: 15 Aug 2015
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Volume: 27
Issue number: 16
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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
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.

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Research group: Nanophotonics
Authors: Dumitrescu, M., Uusitalo, T., Virtanen, H., Viheriälä, J., Salmi, J., Aho, A.
Number of pages: 2
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DOIs: 10.1109/CLEOPR.2015.7376054
Links: https://www.osapublishing.org/conferences.cfm

Bibliographical note
AUX=orc,“Aho, A.T.”
Research output: Scientific › Conference contribution

Lithography-free oxide patterns as templates for self-catalyzed growth of highly uniform GaAs nanowires on Si(111)
We report self-catalyzed growth of GaAs nanowires (NWs) on Si/SiO<inf>x</inf> patterns fabricated by a lithography-free method. The patterns are defined using droplet epitaxy of GaAs nanocrystals, spontaneous oxidation, and thermal annealing. We investigate the influence of the size and density of the nucleation sites on the NW growth process and show that this approach enables the fabrication of highly uniform GaAs NWs with controllable density. The pattern fabrication and NW growth process are studied and discussed in relation to the surface morphology and chemical properties of the Si/SiO<inf>x</inf> patterns. Furthermore, the optical quality of the NWs is investigated by photoluminescence experiments performed for GaAs-AlGaAs core-shell NWs.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Augmented Human Activities (AHA), Frontier Photonics, Department of Physics and Astronomy, University of Turku, University of Turku
Decontamination of Wearable Textile Electrodes for Medical and Health Care Applications

In the medical and health care environment 'intelligent' clothing must endure all the same treatments and procedures as standard hospital textile; that is laundry, disinfection and sterilization. The decontamination level depends on the end-use of the product. The smart garment system for long term body monitoring must be like any other technical underwear; fit well, be comfortable, elastic, vapor permeable, and have easy-care properties capable of enduring multiple cycles of laundry washing. Thus the use of man-made fibers, instead of traditionally used natural fibers, in a body monitoring garment would be more reasonable.

The research focuses on disinfected and sterilized textile electrodes which are applicable for long term body monitoring. As high elasticity, comfort and good vapor permeability are needed, the research concentrates on the electrical and mechanical properties of knitted sensors after sterilization, disinfection and water-repellent treatment. The most important mechanical features of elastic textile electrodes are elongation recovery and dimensional stability. Before sterilization the textile must be cleaned properly from body fluids like blood and sweat. Improving the easy-clean properties would consequently be desirable. By improving the stain repellent or easy cleaning properties, the need for washing can be decreased and a more protective, lower temperature program during laundry washing can be used. These factors not only save energy but also lengthen the lifetime of textile electronics.

The textile surface electric resistance, abrasion resistance, dimensional change and elastic properties following
decontamination processes were studied, including the evaluation of water repellent-treated electrode properties. In addition, the mechanical properties of conventional knits and elastic woven bands were observed after treatment in order to assess their use in smart wearable systems.

In addition to electrodes, the research results can be applied to many other textile electronics components such as conductors, antennae, heat elements, switchers and detectors, because all these components can be achieved with same elements; conventional textile fibers combined with conductive fibers or coatings. The obvious application areas for body monitoring by using textile electrodes are hospitals, health care centers and medical research centers. The textile electrodes are more comfortable and invisible for long time body monitoring which is needed, for example, in rehabilitation after surgery or detection of chronic diseases, where they are more effective than conventional gel (Ag / AgCl) electrodes.

In conclusion it can be stated that silver-plated PA fiber in a knitted or woven structure with added repellent treatment provides a highly conductive and durable solution for wearable electronics in medical and health care applications. The steel fiber and textile mixture cannot tolerate mechanical stress caused by disinfection, washing, or repellent treatment. The knitted textile with silver coating cannot tolerate sterilization, either electrically or mechanically. Based on the results of the study, the use of woven bands as an electrode would be recommended instead of knitted material because they are dimensionally more stable. The electrode dimensional changes might negatively affect the measurement quality. On the other hand, the knitted electrodes have additional useful properties like softness and flexibility, thus compromises must be made in using textile electrodes in wearable technology. All materials in the study, woven and knitted, elastic and inelastic, coated and non-coated showed clear shrinkage in the sterilization process. However, using only one heat treatment makes them much more stable. For this reason it can be assumed that man-made fibers are more useful for medical products as they are more resistant to being sterilized or disinfected than are natural fibers. The elastane fiber can be used for improving bi-directional textile material recovery, but the unrecovered elongation as a function of sterilization must be considered. The variation in unrecovered elongation (stretching) might be extremely high and success depends on raw materials and textile structures.

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**General information**
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Ministry of Education publication type: G4 Doctoral dissertation (monograph)
Organisations: Department of Materials Science
Authors: Ilen, E.
Number of pages: 165
Publication date: 26 Jun 2015

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**Bibliographical note**
Awarding institution:Tampere University of Technology
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Research output: Monograph » Doctoral Thesis

**High power GaInNAs VECSEL emitting at 1230/615 nm**
We report a frequency-doubled VECSEL operating at 1230/615 nm. The gain chip was grown by plasma-assisted MBE and comprised 10 GaInNAs quantum wells. Preliminary experiments show an output power of >8 W at 615 nm.

**General information**
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications
Authors: Penttinen, J., Leinonen, T., Korpijärvi, V., Kantola, E., Guina, M.
Fabrication of Single Wall Carbon Nanotube Saturable Absorber in the Micro-grooved Single Mode Fiber

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

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

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

A 1342 nm Nd:YVO4 microchip laser is reported, Q-switched with a dilute nitride GaInNAs/GaAs saturable absorber mirror. The laser produced optical pulses as short as 204 ps with 2.3 MHz repetition rate and 24 mW average output power. In comparison to conventional InP-based saturable absorber mirrors, the advantage of the proposed approach is the availability of excellent Bragg mirror materials that enable high reflectivity and more flexibility in designing the nonlinear parameters owing to the use of lattice matched GaInNAs/GaAs quantum wells.

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

Microchip laser Q-switched with GaInNAs/GaAs SESAM emitting 204 ps pulses at 1342 nm

A 1342 nm Nd:YVO4 microchip laser is reported, Q-switched with a dilute nitride GaInNAs/GaAs saturable absorber mirror. The laser produced optical pulses as short as 204 ps with 2.3 MHz repetition rate and 24 mW average output power. In comparison to conventional InP-based saturable absorber mirrors, the advantage of the proposed approach is the availability of excellent Bragg mirror materials that enable high reflectivity and more flexibility in designing the nonlinear parameters owing to the use of lattice matched GaInNAs/GaAs quantum wells.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
The Role of Groove Periodicity in the Formation of Site-Controlled Quantum Dot Chains

Structural and optical properties of InAs quantum dot (QD) chains formed in etched GaAs grooves having different periods from 200 to 2000 nm in [010] orientation are reported. The site-controlled QDs were fabricated by molecular beam epitaxy on soft UV-nanoimprint lithography-patterned GaAs(001) surfaces. Increasing the groove periods decreases the overall QD density but increases the QD size and the linear density along the groove direction. The effect of the increased QD size with larger periods is reflected in ensemble photoluminescence measurements as redshift of the QD emission. Furthermore, we demonstrate the photoluminescence emission from single QD chains.
Spontaneous formation of nanostructures by surface spinodal decomposition in GaAs$_{1-x}$Bi$_x$ epilayers

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

Corrosion behaviour of three commercial sintered Nd-Fe-B magnets exposed to environments containing water as vapour, pressurised vapour, and liquid was investigated in order to understand their overall corrosion performance under a range of conditions. Two types of heat humidity exposure tests, namely the 85/85 and pressure cooker test, and the immersion test combined with electrochemical measurements were used as corrosion tests. It was observed that varying the temperature, pressure, and the prevailing state of water in the exposure tests, different corrosion mechanisms were detected on the surface of Nd-Fe-B magnets. The surface finish of the magnet had an effect on the initiation of corrosion in mild heat-humidity exposure. Immersion in liquid water resulted in a corrosion topography where the Nd-rich grain-boundary phase did not corrode selectively as in the other accelerated corrosion tests but was retained intact while the matrix phase underwent corrosion. These results and the dominant corrosion mechanisms of sintered Nd-Fe-B magnets in different environments are presented and discussed in this paper.

General information
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Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Materials Science, Research group: Ceramic materials, Research group: Materials Characterization, Engineering materials science and solutions (EMASS), Friztech Magnet Technology Centre, VTT Technical Research Centre of Finland
Authors: Isotahdon, E., Huttunen-Saarivirta, E., Heinonen, S., Kuokkala, V. T., Paju, M.
Number of pages: 11
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Peer-reviewed: Yes

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Scopus rating (2015): SJR 0.987 SNIP 1.43 CiteScore 3.03
Scopus rating (2014): SJR 1.135 SNIP 1.66 CiteScore 3.13
Scopus rating (2013): SJR 1.064 SNIP 1.597 CiteScore 2.73
Scopus rating (2012): SJR 1.249 SNIP 1.584 CiteScore 2.43
Scopus rating (2011): SJR 1.166 SNIP 1.479 CiteScore 2.41
Scopus rating (2010): SJR 1.07 SNIP 1.221
Scopus rating (2009): SJR 0.957 SNIP 1.367
Scopus rating (2008): SJR 0.899 SNIP 1.207
Scopus rating (2007): SJR 0.889 SNIP 1.216
Scopus rating (2006): SJR 0.897 SNIP 1.147
Scopus rating (2005): SJR 1.074 SNIP 1.212
Scopus rating (2004): SJR 0.903 SNIP 1.35
Scopus rating (2003): SJR 0.909 SNIP 1.04
Scopus rating (2002): SJR 0.797 SNIP 1.047
Scopus rating (2001): SJR 0.615 SNIP 0.967
Scopus rating (2000): SJR 0.738 SNIP 0.94
Scopus rating (1999): SJR 0.766 SNIP 0.927
Monolithic GaInNAsSb/GaAs VECSEL Operating at 1550 nm
The first monolithic GaAs-based vertical-external-cavity surface-emitting laser (VECSEL) operating at 1550 nm is reported. The VECSEL operation is based on a gain mirror which was grown in a single growth run by plasma-assisted molecular beam epitaxy. The gain mirror comprised eight GaInNAsSb/GaAs quantum wells with a photoluminescence peak at 1505 nm and an AlAs/GaAs distributed Bragg reflector ensuring high reflectivity. The VECSEL chip was pumped with an 808-nm diode laser that had a large quantum defect in respect to the lasing wavelength. An output power of 80 mW in continuous wave mode and 210 mW in pulsed pump mode are demonstrated close to room temperature.
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

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Original language: English

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Research output: Collection of articles › Doctoral Thesis

MODEL FOR N INCORPORATION RATE INTO GainNAs

General information
Oxidation of the GaAs semiconductor at the Al2O3/GaAs junction

Atomic-scale understanding and processing of the oxidation of III-V compound-semiconductor surfaces are essential for developing materials for various devices (e.g., transistors, solar cells, and light emitting diodes). The oxidation-induced defect-rich phases at the interfaces of oxide/III-V junctions significantly affect the electrical performance of devices. In this study, a method to control the GaAs oxidation and interfacial defect density at the prototypical Al2O3/GaAs junction grown via atomic layer deposition (ALD) is demonstrated. Namely, pre-oxidation of GaAs(100) with an In-induced c(8 × 2) surface reconstruction, leading to a crystalline c(4 × 2)-O interface oxide before ALD of Al2O3, decreases band-gap defect density at the Al2O3/GaAs interface. Concomitantly, X-ray photoelectron spectroscopy (XPS) from these Al2O3/GaAs interfaces shows that the high oxidation state of Ga (Ga2O3 type) decreases, and the corresponding In2O3 type phase forms when employing the c(4 × 2)-O interface layer. Detailed synchrotron-radiation XPS of the counterpart c(4 × 2)-O oxide of InAs(100) has been utilized to elucidate the atomic structure of the useful c(4 × 2)-O interface layer and its oxidation process. The spectral analysis reveals that three different oxygen sites, five oxidation-induced group-III atomic sites with core-level shifts between -0.2 eV and +1.0 eV, and hardly any oxygen-induced changes at the As sites form during the oxidation. These results, discussed within the current atomic model of the c(4 × 2)-O interface, provide insight into the atomic structures of oxide/III-V interfaces and a way to control the semiconductor oxidation.
GaSb-based SESAM mode-locked Tm: YAG ceramic laser at 2 μm
Tunable and mode-locked laser operation near 2 μm based on different Tm-doped YAG ceramics, 4 at.% and 10 at.%, is demonstrated. Several designs of GaSb-based surface-quantum-well SESAMs are characterized and studied as saturable absorbers for mode-locking. Best mode-locking performance was achieved using an antireflection-coated near-surface quantum-well SESAM, resulting in a pulse duration of ∼3 ps and ∼150 mW average output power at 89 MHz. All mode-locked Tm:YAG ceramic lasers operated at 2012 nm, with over 133 nm demonstrated tuning for continuous-wave operation.

General information
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Ministry of Education publication type: A2 Review article in a scientific journal
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Frontier Photonics
Number of pages: 9
Pages: 1361-1369
Publication date: 26 Jan 2015
Peer-reviewed: Yes

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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
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
Binary TiO2/SiO2 nanoparticle coating for controlling the wetting properties of paperboard

We introduce a flame based aerosol method to fabricate thin films consisting of binary TiO2/SiO2 nanoparticles deposited directly from the flame onto the paperboard. Nanocoatings were prepared with Liquid Flame Spray (LFS) in a roll-to-roll process with the line speed of 50 m/min. Surface wetting behavior of nanocoated paperboard was studied for different Ti/Si ratios in the precursor, affecting TiO2/ SiO2 ratio in the coating. Wettability could be adjusted to practically any water contact angle between 10 and 1600 by setting the Ti/Si ratio in the liquid precursor. Structure of the two component nanocoating was analysed with FE-SEM, TEM, EDS, XPS and XRD. The porous thin film coating was concluded to consist of ca. 10 nm sized mixed oxide nanoparticles with segregated TiO2 and SiO2 phases. Accumulation of carbonaceous compounds on the surface was seen to be almost linearly dependent on the Ti/Si ratio, indicating of each species being exposed in corresponding amount. However, wetting of the surface was observed to follow merely an S-shaped curve, caused by the roughness of the nanocoated surface. Reasons for the observed superhydrophobicity and superhydrophilicity of these binary nanocoatings on paperboard are discussed. (C) 2014 Elsevier B.V. All rights reserved.
1180 nm CW VECSEL emitting 50 W

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications
Publication date: 2015

Host publication information
Title of host publication: Northern Optics & Photonics 2015, 1.-4.6.2015, Saimaa, Finland: Poster in Northern Optics & Photonics 2015, 1.-4.6.2015, Saimaa, Finland

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

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

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

Host publication information
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Publisher: OSA
ISBN (Print): 978-1-4673-7475-0
Links: https://www.osapublishing.org/abstract.cfm?uri=CLEO_Europe-2015-CB_3_1
Research output: Scientific - peer-review - Conference contribution

A new generation sweating thermal manikin for the evaluation of the thermal comfort of protective clothing in Arctic Conditions
Working or staying in cold conditions set high demands for the garments to sustain the thermal comfort of the wearer. The high thermal insulation needed in cold conditions, like in Arctic areas, can cause heat stress when working in high intensity and post exercise chill while the remaining moisture in the clothing layers due to sweating increases heat loss. The thermoregulatory properties of textiles from material level to garment level can be determined with a wide selection of test methods. Hot plates, water vapour permeability tests and a sweating thermal cylinder are used for planar textiles to determine thermal comfort properties on material level to be able to select the most suitable candidates for the garments for the required end use conditions. For garment level testing, the non-movable or movable thermal or sweating thermal manikins offer the most sophisticated objective methods. They simulate human body heat and sweat production and body movements in controlled ambient conditions for determining the thermal comfort properties either of a piece of garment or the whole clothing systems. The effect of garment design can be determined in addition to material properties.
Fabrication and characterization of superluminescent diodes for 2–3 µm wavelength

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Optoelectronics Research Centre, Research group: Nanophotonics, Research group: Semiconductor Technology and Applications, Optoelectronics Research Centre, Tampere University of Technology
Authors: Zia, N., Viheriälä, J., Koskinen, R., Koskinen, M., Suomalainen, S., Guina, M.
Publication date: 2015
Host publication information
Title of host publication: Northern Optics and Photonics 2015 : June 2-4, 2015, Lappeenranta
Research output: Scientific › Conference contribution

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

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Frontier Photonics
Authors: Leinonen, T., Penttinen, J. P., Korpijärvi, V. M., Kantola, E., Guina, M.
Publication date: 2015
Host publication information
Title of host publication: Proceedings of SPIE : Vertical External Cavity Surface Emitting Lasers (VECSELS) V
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Article number: 934909
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Keywords: frequency doubling, high power visible laser, OPSL, orange-red VECSEL, SDL, SHG
DOIs: 10.1117/12.2079162
High-gain 1.3 μm GaInNAs semiconductor optical amplifier with enhanced temperature stability for all-optical signal processing at 10 Gb/s

We report on the complete experimental evaluation of a GaInNAs/GaAs (dilute nitride) semiconductor optical amplifier that operates at 1.3 μm and exhibits 28 dB gain and a gain recovery time of 100 ps. Successful wavelength conversion operation is demonstrated using pseudorandom bit sequence 2^7 - 1 non-return-to-zero bit streams at 5 and 10 Gb/s, yielding error-free performance and showing feasibility for implementation in various signal processing functionalities. The operational credentials of the device are analyzed in various operational regimes, while its nonlinear performance is examined in terms of four-wave mixing. Moreover, characterization results reveal enhanced temperature stability with almost no gain variation around the 1320 nm region for a temperature range from 20°C to 50°C. The operational characteristics of the device, along with the cost and energy benefits of dilute nitride technology, make it very attractive for application in optical access networks and dense photonic integrated circuits.

General information
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Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Frontier Photonics, University of Milan Bicocca, Department of Informatics, Aristotle University of Thessaloniki, Aristotle University of Thessaloniki, School of Electrical and Computer Engineering, National Technical University of Athens, Information Technologies Institute, Center for Research and Technology Hellas
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Scopus rating (2014): SJR 1.066 SNIP 1.534 CiteScore 2.04
Scopus rating (2013): SJR 0.991 SNIP 1.616 CiteScore 1.98
Scopus rating (2012): SJR 1.046 SNIP 1.496 CiteScore 1.79
Scopus rating (2011): SJR 1.044 SNIP 1.777 CiteScore 1.92
Scopus rating (2010): SJR 1.082 SNIP 1.636
Scopus rating (2009): SJR 1.222 SNIP 1.711
Scopus rating (2008): SJR 1.334 SNIP 1.711
Scopus rating (2007): SJR 1.216 SNIP 1.613
Scopus rating (2006): SJR 1.135 SNIP 1.748
Scopus rating (2005): SJR 1.192 SNIP 1.767
Scopus rating (2004): SJR 1.053 SNIP 1.889
Scopus rating (2003): SJR 1.236 SNIP 1.679
Scopus rating (2002): SJR 1.221 SNIP 1.922
Scopus rating (2001): SJR 1.424 SNIP 1.724
Scopus rating (2000): SJR 1.102 SNIP 1.04
Scopus rating (1999): SJR 2.032 SNIP 0.99
Original language: English
ASJC Scopus subject areas: Atomic and Molecular Physics, and Optics
DOIs:
10.1364/AO.54.000046

Bibliographical note
Siirretään Portfolio15<br/>Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2015-01-08<br/>Publisher name: Optical Society of America
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Ill-N/Bu-V based high efficiency solar cells: recent developments ad future prospects

General information
State: Published
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications
Authors: Guina, M.
Publication date: 2015
Peer-reviewed: Unknown

Bibliographical note
xpresentation
"Invited talk"

Influence of Diffusion Barriers on Thermal Ageing Behaviour of Solar Absorber Coatings on Copper

The thermal stability of magnetron sputtered and electroplated solar absorber coatings were investigated at elevated temperatures of 200-500°C. Diffusion barriers of aluminium and nickel were studied towards thermal diffusion of copper substrate atoms.

The diffusion barriers studied were experimental magnetron sputtered Al layers and an industrial electroplated Ni layer between a Cu substrate and an absorber coating. The thicknesses of Al barriers were 0.1 µm and 0.5 µm, and a Ni barrier was 3 µm thick. As absorber coatings, magnetron sputtered chromium-based coatings and industrially electroplated black chromium coatings, were studied. The sputtered absorbers were a 3-layer stack of CrOx/Cr/CrOx with layer thicknesses of 0.05/0.03/0.05 µm, respectively. The electroplated black chromium coating had a thickness of 0.2 µm. Copper was used as a substrate for all of the absorbers studied.

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

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

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

Host publication information
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ISBN (Print): 978-81-926196-1-3
Keywords: Thermal ageing, Thin films, Absorber coating, Aluminium barrier, Copper substrate, Diffusion barrier, Magnetron sputtering, Stability
Research output: Scientific - peer-review » Conference contribution

MBE GROWN GaInNAsSb MULTIJUNCTION SOLAR CELLS: PATH TOWARDS 50% EFFICIENCY

General information
State: Published
Ministry of Education publication type: D3 Professional conference proceedings
Optical properties and thermionic emission in solar cells with InAs quantum dots embedded within GaNAs and GaInNAs

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

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Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Augmented Human Activities (AHA), Frontier Photonics, Faculty of Exact Sciences and Engineering, Hyperion University
Authors: Polojärvi, V., Pavelescu, E., Schramm, A., Tukiainen, A., Aho, A., Puustinen, J., Guina, M.
Number of pages: 4
Pages: 122-125
Publication date: 2015
Peer-reviewed: Yes
Early online date: 19 Jun 2015

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- Scopus rating (2014): SJR 2.744 SNIP 2.124 CiteScore 3.55
- Scopus rating (2013): SJR 2.347 SNIP 1.975 CiteScore 3.19
- Scopus rating (2012): SJR 2.309 SNIP 2.022 CiteScore 3.01
- Scopus rating (2011): SJR 2.333 SNIP 2.108 CiteScore 3.21
- Scopus rating (2010): SJR 2.445 SNIP 2.125
- Scopus rating (2009): SJR 2.574 SNIP 2.02
- Scopus rating (2008): SJR 2.634 SNIP 2.128
- Scopus rating (2007): SJR 2.229 SNIP 2.174
- Scopus rating (2006): SJR 2.1 SNIP 1.915
- Scopus rating (2005): SJR 1.831 SNIP 1.915
- Scopus rating (2004): SJR 1.464 SNIP 1.731
- Scopus rating (2003): SJR 1.499 SNIP 1.709
- Scopus rating (2002): SJR 1.509 SNIP 1.345
- Scopus rating (2001): SJR 1.301 SNIP 1.361
- Scopus rating (2000): SJR 1.268 SNIP 1.123
- Scopus rating (1999): SJR 1.53 SNIP 1.162

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Keywords: Quantum dot, Quantum well, Solar cell, Strain engineering, Thermal escape

DOIs:
10.1016/j.scriptamat.2015.06.033
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.

Quantum dot semiconductor disk laser at 1.3 μm

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.
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.

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, École Polytechnique Fédérale de Lausanne, CH-1015 Lausanne, Switzerland
Authors: Sirbu, A., Rantamäki, A., Iakolev, V., Mereuta, A., Caliman, A., Volet, N., Lyytikäinen, J., Okhotnikov, O., Kapon, E.
Number of pages: 7
Publication date: 2015

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Simulated and Experimental Performance of High Efficiency GaInNAsSb Solar Cells

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

Bibliographical note
Research output: Professional › Conference contribution

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.

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, Department of Materials Science, Research group: Materials Characterization, Engineering materials science and solutions (EMASS), Frontier Photonics
Authors: Suomalainen, S., Hakkarainen, T. V., Salminen, T., Koskinen, R., Honkanen, M., Luna, E., Guina, M.
Publication date: 2015
Peer-reviewed: Yes

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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
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 -7.5 mV/°C, 0.040 mA/cm²/°C, and -0.09%/°C, respectively.
Thermal Management in Long-Wavelength Flip-Chip Semiconductor Disk Lasers

General information
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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
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Scopus rating (2014): SJR 1.889 SNIP 2.072 CiteScore 3.49
Scopus rating (2013): SJR 2.258 SNIP 2.38 CiteScore 4.55
Scopus rating (2012): SJR 2.742 SNIP 2.661 CiteScore 4.35
Scopus rating (2011): SJR 2.367 SNIP 2.845 CiteScore 3.87
Scopus rating (2010): SJR 2.217 SNIP 2.599
Scopus rating (2009): SJR 2.964 SNIP 2.869
Scopus rating (2008): SJR 2.476 SNIP 2.433
Scopus rating (2007): SJR 2.428 SNIP 1.746
Scopus rating (2006): SJR 2.131 SNIP 2.383
Scopus rating (2005): SJR 2.93 SNIP 2.594
Scopus rating (2004): SJR 2.827 SNIP 2.62
Scopus rating (2003): SJR 3.121 SNIP 3.103
Scopus rating (2002): SJR 2.664 SNIP 2.508
Scopus rating (2001): SJR 2.25 SNIP 1.926
Scopus rating (2000): SJR 2.37 SNIP 1.335
Scopus rating (1999): SJR 3.466 SNIP 1.611
Original language: English
DOIs:
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ORG=orc,0.5
ORG=elt,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.
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Publisher: SPIE
Yellow-orange semiconductor disk lasers for medical applications

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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

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

Bibliographical note
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Research output: Scientific › Conference contribution

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

General information
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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
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Nanofabrication and Adsorption Studies of Organic Molecules on Metal and Metal Alloy Surfaces as Templates for Biofunctional Applications

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

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Organisations: Optoelectronics Research Centre
Authors: Vuori, L.
Number of pages: 70
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Publisher: Tampere University of Technology
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ISSN (Print): 1459-2045
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vuori.pdf
Polymer Hybrid Thin-Film Composites with Tailored Permeability and Anti-Fouling Performance

Composites and hybrid materials are new material combinations which can provide added value for existing products or create novel multifunctional properties. This thesis aimed at fabricating and modifying thin-film composites (TFC) by using various coating technologies. Moreover, the target was to tailor the permeability or to create anti-fouling performance. Inorganic, inorganic-organic and organic coating layers were made by atmospheric plasma deposition (APD), sol-gel (SG), atomic-layer-deposition (ALD) or polyvinyl alcohol (PVA) dispersion coating methods. Coatings were deposited using either roll-to-roll or batch process. APD method was used to create an inorganic silicon oxide (SiOx) coating layer on a low-density polyethylene (LDPE) coated board. In addition, atmospheric plasma was used for pre-treatment of LDPE surface prior to SG coatings. The SiOx coatings did not show a significant improvement in barrier performance using the specific roll-to-roll process. Therefore, SG coating method was studied instead in order to form a barrier layer on LDPE-board by using the roll-to-roll process. SG coatings reduced the surface roughness and made the polymer surfaces either hydrophilic or hydrophobic. In addition, the coating chemistry had an effect on the oxygen and grease barrier performances. The highly cross-linked SG coating gave a better oxygen barrier performance, while the other SG coating revealed an enhancement in the grease barrier. Plasma activation of the LDPE surface enhanced the wettability and adhesion of both SG coatings. In addition, SG coating was applied on a polylactic acid (PLA) coated board. The SG coating created favourable, smooth and hydrophilic primer layer on PLA-board, which was further coated with an inorganic aluminium oxide (Al2O3) skin layer by using ALD. The particular TFC structure based on ALD and SG coatings gave a slightly better barrier performance compared to a plain ALD coating. PVA and ALD based antifouling coatings increased the hydrophilicity and surface polarity of the polyamide (PA) TFC membranes. All the coated membranes indicated an enhancement in bacteria-repellence. Indeed, the improvement in the bacterial anti-adhesion performance of coated membranes was due to an increase in surface polarity. The biocide-modified PVA coatings enhanced further the anti-fouling performance due to their antimicrobial activity. As expected, in comparison to the uncoated membrane, the PVA-coated membranes trend to increase the salt rejection and to reduce the water and salt permeability. However, the biocide-modified PVA coatings decreased the water permeability and showed also a minor decline on the salt rejection. The ALD coatings increased the water and salt permeability and furthermore, reduced the salt rejection.
Switchable water absorption of paper via liquid flame spray nanoparticle coating

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

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Authors: Teisala, H., Tuominen, M., Haapanen, J., Aromaa, M., Stepien, M., Mäkelä, J. M., Saarinen, J. J., Toivakka, M., Kuusipalo, J.
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Scopus rating (2013): SJR 1.127 SNIP 1.48 CiteScore 3.83
Scopus rating (2012): SJR 1.179 SNIP 1.71 CiteScore 3.74
Scopus rating (2011): SJR 1.354 SNIP 1.795 CiteScore 3.99
Scopus rating (2010): SJR 0.873 SNIP 1.384
Scopus rating (2009): SJR 1.038 SNIP 1.219
Scopus rating (2008): SJR 0.926 SNIP 1.123
Scopus rating (2007): SJR 0.754 SNIP 1.034
Scopus rating (2006): SJR 0.699 SNIP 1.15
Scopus rating (2005): SJR 1.112 SNIP 1.318
Scopus rating (2004): SJR 0.855 SNIP 1.072
Scopus rating (2003): SJR 0.81 SNIP 1.02
Scopus rating (2002): SJR 0.649 SNIP 0.889
Scopus rating (2001): SJR 0.602 SNIP 0.785
Scopus rating (2000): SJR 0.583 SNIP 0.773
Scopus rating (1999): SJR 0.67 SNIP 1.14
Original language: English
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Textile-Based Sensors and Smart Clothing System for Respiratory Monitoring

Long-term respiratory monitoring provides valuable information for diagnostic and clinical treatment. Traditional measures of respiration require a mouthpiece or a mask, neither of which can be used as ubiquitous healthcare equipment. Using a smart clothing system seems to be a better alternative. Researchers in the field of smart textiles have focused on the development of health-related products since the 1990s, and textile-based sensors used for respiratory measurements have been discussed in several projects. Although the soft and flexible characteristics of textile-based sensors make them attractive, the flexibility of the materials also affects the signal quality. In a laboratory situation, where each sensor is tested as a single element, this is not as critical as in a user situation, where the sensor is integrated into the clothing and worn by different users engaging in different activities. The principal objective of this thesis was to explore the possibility of performing reliable respiratory monitoring using a clothing platform. The research began by investigating the possible methods and materials that can be used to produce textile-based sensors for respiratory monitoring applications. The aim was to determine the most suitable method for integrating the sensing function into the clothing system. Study results have shown that sensors made with a conductive coating demonstrated superior performance in terms of sensitivity, stability, and reliability. Therefore, five prototype systems based on conductive coating technique were developed. Sensor placement, signal collection techniques, and the clothing system configuration were the main concerns, while issues related to the sensor wearability, maintenance, and aesthetic appearance, as well as the environment and health, were also discussed. Knitting was found to be the most economical method for producing the textile-based sensors; however, sensors made of knit fabric do not perform as well as the coated ones. Therefore, elastic-conductive hybrid yarns have been created to improve the electro-mechanical properties of knitted-based sensors, and eventually, a prototype with two sensors and a built-in data-bus was made by fully-fashion knitting technique. Two smart clothing system prototypes, based on conductive coating technique, were tested systematically by ten subjects. The first prototype consisted of one sensing element, and the results show that the smart clothing system could successfully monitor the subjects’ breathing patterns during sitting, standing, and different forms of running. The system has also proven to be useful in the observation of sleep apnea disorder symptoms. The second prototype consisted of two sensing elements. Apart from all the characteristics of the first prototype system, a system with two sensing elements can be used to determine the relationship between the rib cage and abdomen compartments, which provides information for certain diseases, e.g., cardiac arrhythmias. The second smart clothing system prototype was compared with a conventional respiratory belt for validation. Signals from the clothing system and the respiratory belt were collected simultaneously with a self-designed LabVIEW program, and further processed with MATLAB. Quantitative analyses were conducted based upon different comparison techniques, such as Pearson's correlation, ANOVA and Fast Fourier Transform analysis. The results demonstrate that the smart clothing system can provide reliable respiratory measurements, with signals of comparable quality to the conventional respiratory belt. In addition, the wearability and user acceptance were studied by means of a survey. The survey results indicate that users were more comfortable with the smart clothing system and that most believe that using a smart clothing system will improve both health condition and quality of life.
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

General information
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Organisations: Optoelectronics Research Centre, Research group: Ultrafast and intense lasers, Research group: Semiconductor Technology and Applications, Frontier Photonics, Russian Acad Sci, Russian Academy of Sciences, Fiber Opt Res Ctr
Authors: Heikkinen, J., Gumenyuk, R., Rantamäki, A., Leinonen, T., Melkumov, M., Dianov, E. M., Okhotnikov, O. G.
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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
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GENERATION, EMITTING LASER, FS PULSES, NM, SURFACE, VECSEL, WAVELENGTH
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http://www.scopus.com/inward/record.url?scp=84901290354&partnerID=8YFlgXK (Link to publication in Scopus)

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Source-ID: 431
Research output: Scientific › peer-review › Article
Composition dependent growth dynamics in molecular beam epitaxy of GaInNAs solar cells

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

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

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Organisations: Optoelectronics Research Centre
Authors: Hakkarainen, T.
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Research output: Collection of articles › Doctoral Thesis

1.33 um MOPA system based on ultrafast semiconductor disk laser and bismuth fiber amplifier

General information
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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.
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Publication date: 2014
1.55 µm GaInNAsSb/GaAs ridge waveguide lasers and semiconductor optical amplifiers for photonic integrated circuits

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Authors: Korpijärvi, V., Giannoulis, G., Mäkelä, J., Viheriälä, J., Iliadis, N., Avramopoulos, H., Laakso, A., Guina, M.
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50-ps Passively Mode-Locked Red Praseodymium Laser

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Authors: Gaponenko, M., Metz, P. W., Härkönen, A., Heuer, A., Leinonen, T., Guina, M., Südmeyer, T., Huber, G., Kränkel, C.
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55 μm GaInNAsSb/GaAs ridge waveguide lasers and semiconductor optical amplifiers

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Organisations: Optoelectronics Research Centre
Authors: Mäkelä, J., Korpijärvi, V., Viheriälä, J., Giannoulis, G., Iliadis, N., Avramopoulos, H., Guina, M.
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Publisher: Finnish Optical Society
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**Publication series**

Name: Optics and Photonics Days

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

**General information**

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Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Materials Science, Research group: Paper Converting and Packaging, Department of Physics, Research area: Aerosol Physics, Research group: Aerosol Synthesis, Engineering materials science and solutions (EMASS), Abo Akad Univ, Abo Akademi University, Dept Phys, Paper and Fibre Research Institute (PFI), SP Technical Research Institute of Sweden
Authors: Stepień, M., Chinga-Carrasco, G., Saarinen, J. J., Teisala, H., Tuominen, M., Haapanen, J., Kuusipalo, J., Mäkelä, J. M., Toivakka, M.
Number of pages: 15
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Links:
http://www.scopus.com/inward/record.url?scp=84942588921&partnerID=8YFLogxK (Link to publication in Scopus)
Adjustable wetting of Liquid Flame Spray (LFS) TiO2-nanoparticle coated board: Batch-type versus roll-to-roll Stimulation methods

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

Publication information
Volume: 29
Issue number: 2
ISSN (Print): 0283-2631
Ratings:
Scopus rating (2016): CiteScore 1.2 SJR 0.385 SNIP 0.652
Scopus rating (2015): SJR 0.375 SNIP 0.787 CiteScore 0.91
Scopus rating (2014): SJR 0.444 SNIP 0.823 CiteScore 0.99
Scopus rating (2013): SJR 0.389 SNIP 0.684 CiteScore 0.71
Scopus rating (2012): SJR 0.628 SNIP 1.281 CiteScore 1.13
Scopus rating (2011): SJR 0.582 SNIP 0.902 CiteScore 0.78
Scopus rating (2010): SJR 0.658 SNIP 0.764
Scopus rating (2009): SJR 1.167 SNIP 0.984
Scopus rating (2008): SJR 0.928 SNIP 0.857
Scopus rating (2007): SJR 2.018 SNIP 1.035
Scopus rating (2006): SJR 1.002 SNIP 0.951
Scopus rating (2005): SJR 1.181 SNIP 0.997
Scopus rating (2004): SJR 2.08 SNIP 1.354
Scopus rating (2003): SJR 2.952 SNIP 1.129
Scopus rating (2002): SJR 1.836 SNIP 1.145
Scopus rating (2001): SJR 1.12 SNIP 1.147
Scopus rating (2000): SJR 1.086 SNIP 1.154
Scopus rating (1999): SJR 1.086 SNIP 1.001
Original language: English
DOIs:
10.3183/NPPRJ-2014-29-02-p271-279

Bibliographical note
Contribution: organisation=mol,FACT1=0.5<br/>
Contribution: organisation=fys,FACT2=0.5<br/>
Portfolio EDEND: 2014-08-04<br/>
Publisher name: Svenska Pappers- och Cellulosaingenioersfoereningen
Source: researchoutputwizard
Source-ID: 1655
Research output: Scientific - peer-review › Article
Analytic modeling of temperature dependence of 2D carrier mobility in as-grown and annealed GaInNAs/GaAs quantum well structures

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Donmez, O., Sarcan, F., Lisesivdin, S., Vaughan, M., Erol, A., Gunes, M., Arikan, M., Puustinen, J., Guina, M.
Number of pages: 13
Pages: 1-13
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Semiconductor Science and Technology
Volume: 29
Article number: 125009
ISSN (Print): 0268-1242
Ratings:
Scopus rating (2016): SJR 0.632 SNIP 0.866 CiteScore 1.75
Scopus rating (2015): SJR 0.675 SNIP 0.977 CiteScore 1.73
Scopus rating (2014): SJR 0.991 SNIP 1.088 CiteScore 1.72
Scopus rating (2013): SJR 1.173 SNIP 1.133 CiteScore 1.53
Scopus rating (2012): SJR 1.051 SNIP 0.982 CiteScore 1.42
Scopus rating (2011): SJR 1.01 SNIP 1.08 CiteScore 1.66
Scopus rating (2010): SJR 0.82 SNIP 0.88
Scopus rating (2009): SJR 0.886 SNIP 0.914
Scopus rating (2008): SJR 1.298 SNIP 1.291
Scopus rating (2007): SJR 1.252 SNIP 1.161
Scopus rating (2006): SJR 1.193 SNIP 1.095
Scopus rating (2005): SJR 1.216 SNIP 1.133
Scopus rating (2004): SJR 1.42 SNIP 1.142
Scopus rating (2003): SJR 1.235 SNIP 0.981
Scopus rating (2002): SJR 0.996 SNIP 0.925
Scopus rating (2001): SJR 0.962 SNIP 0.845
Scopus rating (2000): SJR 1.193 SNIP 0.811
Scopus rating (1999): SJR 1.193 SNIP 0.874
Original language: English
DOIs:
10.1088/0268-1242/29/12/125009

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2014-11-21<br/>Publisher name: Institute of Physics
Publishing
Source: researchoutputwizard
Source-ID: 264
Research output: Scientific - peer-review › Article

A new Generation Sweating Thermal Manikin for the Evaluation of the Thermoregulation Properties of Protective Clothing

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Materials Science
Authors: Varheenmaa, M.
Number of pages: 5
Pages: 1-5
Publication date: 2014

Host publication information
Title of host publication: Ambience14&10i3m, Tampere Hall, Tampere, Finland 7-9 September 2014
Applications of supercritical carbon dioxide in materials processing and synthesis

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

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

Bibliographical note
Contribution: organisation=mol,FACT1=1</br>Portfolio EDEND: 2014-10-16</br>Publisher name: The Royal Society of Chemistry
Source: researchoutputwizard
Source-ID: 1845
Research output: Scientific - peer-review › Review Article

Askeleen edellä - puettavan teknologian markkinat kasvussa

General information
State: Published
Ministry of Education publication type: D1 Article in a trade journal
Organisations: Department of Materials Science
Authors: Rantasalo, S.
Number of pages: 1
Pages: 10-10
Publication date: 2014
Peer-reviewed: Unknown

Publication information
Journal: Tekstiililehti
Issue number: 2
ISSN (Print): 0040-2370
Original language: Finnish
Biofunctional hybrid materials: bimolecular organosilane monolayers on FeCr alloys

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

Publication information
Journal: Nanotechnology
Volume: 25
Issue number: 43
Article number: 435603
ISSN (Print): 0957-4484
Ratings:
Scopus rating (2016): CiteScore 2.87 SJR 1.096 SNIP 0.814
Scopus rating (2015): SJR 1.18 SNIP 0.966 CiteScore 3.07
Scopus rating (2014): SJR 1.465 SNIP 1.258 CiteScore 3.09
Scopus rating (2013): SJR 1.585 SNIP 1.244 CiteScore 2.74
Scopus rating (2012): SJR 1.846 SNIP 1.306 CiteScore 3.34
Scopus rating (2011): SJR 1.892 SNIP 1.461 CiteScore 3.86
Scopus rating (2010): SJR 1.844 SNIP 1.259
Scopus rating (2009): SJR 1.819 SNIP 1.28
Scopus rating (2008): SJR 1.875 SNIP 1.333
Scopus rating (2007): SJR 1.91 SNIP 1.36
Scopus rating (2006): SJR 1.934 SNIP 1.378
Scopus rating (2005): SJR 1.925 SNIP 1.445
Scopus rating (2004): SJR 1.849 SNIP 1.477
Scopus rating (2003): SJR 1.427 SNIP 1.371
Scopus rating (2002): SJR 0.962 SNIP 0.993
Scopus rating (2001): SJR 0.901 SNIP 0.94
Scopus rating (2000): SJR 0.881 SNIP 0.891
Scopus rating (1999): SJR 1.131 SNIP 0.953
Original language: English
DOIs:
10.1088/0957-4484/25/43/435603

Bibliographical note
Contribution: organisation=orc,FACT1=1
Portfolio EDEND: 2014-10-17
Publisher name: Institute of Physics

Cavity-enhanced single photon emission from site-controlled In(Ga)As quantum dots fabricated using nanoimprint lithography

General information
Controlling the synergetic effects in (3-aminopropyl) trimethoxysilane and (3-mercaptopropyl) trimethoxysilane coadsorption on stainless steel surfaces

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Augmented Human Activities (AHA), Frontier Photonics
Authors: Tommila, J., Belykh, V., Hakkarainen, T. V., Heinonen, E., Sibeldin, N., Schramm, A., Guina, M.
Number of pages: 4
Pages: 1-4
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: APPLIED PHYSICS LETTERS
Volume: 104
Article number: 213104
ISSN (Print): 0003-6951
Ratings:
Scopus rating (2016): CiteScore 2.67 SJR 1.132 SNIP 0.996
Scopus rating (2015): SJR 1.085 SNIP 0.983 CiteScore 2.47
Scopus rating (2014): SJR 1.799 SNIP 1.462 CiteScore 3.25
Scopus rating (2013): SJR 2.149 SNIP 1.652 CiteScore 3.77
Scopus rating (2012): SJR 2.554 SNIP 1.754 CiteScore 3.76
Scopus rating (2011): SJR 2.805 SNIP 1.94 CiteScore 4.04
Scopus rating (2010): SJR 2.926 SNIP 1.789
Scopus rating (2009): SJR 2.857 SNIP 1.848
Scopus rating (2008): SJR 2.934 SNIP 1.83
Scopus rating (2007): SJR 3.039 SNIP 1.913
Scopus rating (2006): SJR 3.457 SNIP 2.288
Scopus rating (2005): SJR 3.709 SNIP 2.382
Scopus rating (2004): SJR 3.904 SNIP 2.38
Scopus rating (2003): SJR 3.765 SNIP 2.27
Scopus rating (2002): SJR 3.917 SNIP 2.365
Scopus rating (2001): SJR 4.111 SNIP 2.212
Scopus rating (2000): SJR 4.277 SNIP 2.013
Scopus rating (1999): SJR 4.35 SNIP 2.11
Original language: English
DOIs: 10.1063/1.4879845

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2014-06-30<br/>Publisher name: American Institute of Physics AIP
Source: researchoutputwizard
Source-ID: 1639
Research output: Scientific - peer-review › Article
Control of emitted light polarization in a 1310nm dilute nitride spin-vertical cavity surface emitting laser subject to circularly polarized optical injection

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Alharti, A., Hurtado, A., Al Seyab, R., Korpijärvi, V., Guina, M., Henning, I., Adams, M.
Number of pages: 5
Pages: 1-5
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: APPLIED PHYSICS LETTERS
Volume: 105
Issue number: 18
Article number: 181106
ISSN (Print): 0003-6951
Ratings:
Scopus rating (2016): CiteScore 2.67 SJR 1.132 SNIP 0.996
Scopus rating (2015): SJR 1.085 SNIP 0.983 CiteScore 2.47
Scopus rating (2014): SJR 1.799 SNIP 1.462 CiteScore 3.25
Scopus rating (2013): SJR 2.149 SNIP 1.652 CiteScore 3.77
Scopus rating (2012): SJR 2.554 SNIP 1.754 CiteScore 3.76
Scopus rating (2011): SJR 2.805 SNIP 1.94 CiteScore 4.04
Scopus rating (2010): SJR 2.926 SNIP 1.789
Scopus rating (2009): SJR 2.857 SNIP 1.848
Scopus rating (2008): SJR 2.934 SNIP 1.83
Control of the Emitted Polarization in a 1310 nm spin-VCSEL Subject to Circularly Polarized Optical-Injection

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

Host publication information
Title of host publication: Conference on Lasers and Electro-Optics, CLEO: Science and Innovations, June 8-13, 2014, San Jose, CA, USA
Publisher: Optical Society of America
ISBN (Print): 978-1-55752-999-2

Publication series
Name: Conference on Lasers and Electro-Optics
DOIs: 10.1364/CLEO_SI.2014.SF1G.7

Bibliographical note
Session: Vertical Cavity Lasers, Paper SF1G.7<br/>Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2014-10-21<br/>Publisher name: Optical Society of America
Source: researchoutputwizard
Source-ID: 90
Research output: Scientific - peer-review › Conference contribution

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
Publication date: 2014

Bibliographical note
Session: Vertical Cavity Lasers, Paper SF1G.7<br/>Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2014-10-21<br/>Publisher name: Optical Society of America
Source: researchoutputwizard
Source-ID: 90
Research output: Scientific - peer-review › Conference contribution
Determination of the functionality of monolayers of aminopropyl trimethoxy silane and mercaptopropyl trimethoxy silane on stainless steel with SR-PES and chemical derivatization

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

Dilute Nitride Space Solar Cells: Towards 4 Junctions

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre
Authors: Aho, A., Tukiainen, A., Polojärvi, V., Guina, M.
Number of pages: 3
Pages: 1-3
Publication date: 2014
Dynamics of time-resolved photoluminescence in GaInNAs and GaNAsSb solar cells

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Department of Chemistry and Bioengineering, Research group: Supramolecular photochemistry, Frontier Photonics
Authors: Gubanov, A., Polojärvi, V., Aho, A., Tukiainen, A., Tkachenko, N. V., Guina, M.
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Nanoscale Research Letters
Volume: 9
Article number: 80
ISSN (Print): 1931-7573
Ratings:
Scopus rating (2016): SJR 0.589 SNIP 0.746 CiteScore 2.15
Scopus rating (2015): SJR 0.538 SNIP 0.653 CiteScore 1.69
Scopus rating (2014): SJR 0.748 SNIP 1.019 CiteScore 2.15
Scopus rating (2013): SJR 0.79 SNIP 0.967 CiteScore 2.23
Scopus rating (2012): SJR 1.049 SNIP 1.073 CiteScore 2.58
Scopus rating (2011): SJR 1.04 SNIP 1.124 CiteScore 2.88
Scopus rating (2010): SJR 1.062 SNIP 1.007
Scopus rating (2009): SJR 1.063 SNIP 1.01
Scopus rating (2008): SJR 0.828 SNIP 0.632
Scopus rating (2007): SJR 1.458 SNIP 0.71
Original language: English
DOIs:

Evaluation of thermal Comfort Properties of Prototype Uniforms for Rescue Team Workers

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Materials Science
Authors: Varheenmaa, M.
Number of pages: 6
Pages: 1-6
Publication date: 2014

Host publication information
Title of host publication: Ambience14&10i3m, Tampere Hall, Tampere, Finland 7-9 September 2014
Editor: Varheenmaa, M.

Publication series
Extruded polymer films for optimal enzyme-catalyzed oxygen scavenging

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Materials Science, Engineering materials science and solutions (EMASS)
Authors: Johansson, K., Kotkamo, S., Rotabakk, T. B., Johansson, C., Kuusipalo, J., Jönsson, L. J., Jörnström, L.
Number of pages: 9
Pages: 1-8
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Chemical Engineering Science
Volume: 108
ISSN (Print): 0009-2509
Ratings:
Scopus rating (2016): CiteScore 3.05 SJR 1.037 SNIP 1.442
Scopus rating (2015): SJR 1.038 SNIP 1.606 CiteScore 2.96
Scopus rating (2014): SJR 1.115 SNIP 1.642 CiteScore 2.81
Scopus rating (2013): SJR 1.157 SNIP 1.866 CiteScore 2.95
Scopus rating (2012): SJR 1.189 SNIP 1.847 CiteScore 2.77
Scopus rating (2011): SJR 1.205 SNIP 1.685 CiteScore 2.8
Scopus rating (2010): SJR 1.319 SNIP 1.708
Scopus rating (2009): SJR 1.293 SNIP 1.759
Scopus rating (2008): SJR 1.299 SNIP 1.6
Scopus rating (2007): SJR 1.347 SNIP 1.523
Scopus rating (2006): SJR 1.308 SNIP 1.553
Scopus rating (2005): SJR 1.445 SNIP 1.801
Scopus rating (2004): SJR 1.301 SNIP 1.858
Scopus rating (2003): SJR 1.7 SNIP 1.676
Scopus rating (2002): SJR 1.675 SNIP 1.279
Scopus rating (2001): SJR 1.706 SNIP 1.734
Scopus rating (2000): SJR 1.313 SNIP 1.307
Scopus rating (1999): SJR 1.214 SNIP 1.539
Original language: English
DOIs:
10.1016/j.ces.2013.12.035

Formation and phase transformation of Bi-containing QD-like clusters in annealed GaAsBi

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
GaSb-based SESAM Mode-Locked Tm,Ho:KLW 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
Green (In,Ga,Al)P-GaP light-emitting diodes grown on high-index GaAs surfaces

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

Publication information
Journal: APPLIED PHYSICS LETTERS
Volume: 105
Issue number: 18
Article number: 181902
ISSN (Print): 0003-6951
Ratings:
Scopus rating (2016): CiteScore 2.67 SJR 1.132 SNIP 0.996
Scopus rating (2015): SJR 1.085 SNIP 0.983 CiteScore 2.47
Scopus rating (2014): SJR 1.799 SNIP 1.462 CiteScore 3.25
Scopus rating (2013): SJR 2.149 SNIP 1.652 CiteScore 3.77
Scopus rating (2012): SJR 2.554 SNIP 1.754 CiteScore 3.76
Scopus rating (2011): SJR 2.805 SNIP 1.94 CiteScore 4.04
Scopus rating (2010): SJR 2.926 SNIP 1.789
Scopus rating (2009): SJR 2.857 SNIP 1.848
Scopus rating (2008): SJR 2.934 SNIP 1.83
Scopus rating (2007): SJR 3.039 SNIP 1.913
Scopus rating (2006): SJR 3.457 SNIP 2.288
Scopus rating (2005): SJR 3.709 SNIP 2.382
Scopus rating (2004): SJR 3.904 SNIP 2.38
Scopus rating (2003): SJR 3.765 SNIP 2.27
Scopus rating (2002): SJR 3.917 SNIP 2.365
Scopus rating (2001): SJR 4.111 SNIP 2.212
Scopus rating (2000): SJR 4.277 SNIP 2.013
Scopus rating (1999): SJR 4.35 SNIP 2.11
Original language: English
DOIs:
10.1063/1.4900938

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Publisher name: American Institute of Physics AIP
Source: researchoutputwizard
Source-ID: 903
Research output: Scientific - peer-review › Article
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
High-efficiency tunable yellow-orange VECSEL with an output power of 20 W

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Kantola, E., Leinonen, T., Ranta, S., Tavast, M., Guina, M.
Number of pages: 7
Pages: 1-7
Publication date: 2014

Host publication information
Title of host publication: Photonics West 2014, Vertical External Cavity Surface Emitting Lasers (VECSELs) IV, February 1-6, 2014, San Fransisco, CA, USA. Proceedings of SPIE
Publisher: SPIE
Article number: 89660D
ISBN (Print): 978-0-8194-9879-3

Publication series
Name: SPIE conference proceedings
Volume: 8966
ISSN (Print): 0277-786X
ISSN (Electronic): 1996-756X
DOIs:
10.1117/12.2037676

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 gain 1.3-μm GainNAs SOA with fast gain dynamics and enhanced temperature stability

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Fitsios, D., Giannoulis, G., Iliadis, N., Korpijärvi, V., Viheriälä, J., Laakso, A., Dris, S., Spyropoulou, M., Avramopoulos, H., Kanellos, G., Pleros, N., Guina, M.
Number of pages: 6
Pages: 1-6
Publication date: 2014

Host publication information
Publisher: SPIE
ISBN (Print): 978-0-8194-9895-3

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2014-08-31<br/>Publisher name: SPIE - International Society for Optical Engineering
Source: researchoutputwizard
Source-ID: 653
Research output: Scientific - peer-review › Conference contribution
High performance wafer-fused semiconductor disk lasers emitting in the 1300 nm waveband

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

Publication information
Journal: Optics Express
Volume: 22
Issue number: 24
ISSN (Print): 1094-4087
Ratings:
Scopus rating (2016): CiteScore 3.48 SJR 1.487 SNIP 1.589
Scopus rating (2015): SJR 1.976 SNIP 1.755 CiteScore 3.78
Scopus rating (2014): SJR 2.349 SNIP 2.166 CiteScore 4.18
Scopus rating (2013): SJR 2.358 SNIP 2.226 CiteScore 4.38
Scopus rating (2012): SJR 2.587 SNIP 2.145 CiteScore 3.85
Scopus rating (2011): SJR 2.579 SNIP 2.606 CiteScore 4.04
Scopus rating (2010): SJR 2.943 SNIP 2.466
Scopus rating (2009): SJR 3.092 SNIP 2.669
Scopus rating (2008): SJR 3.195 SNIP 2.393
Scopus rating (2007): SJR 3.27 SNIP 2.032
Scopus rating (2006): SJR 3.233 SNIP 2.326
Scopus rating (2005): SJR 3.334 SNIP 2.379
Scopus rating (2004): SJR 2.833 SNIP 2.499
Scopus rating (2003): SJR 2.688 SNIP 2.193
Scopus rating (2002): SJR 1.547 SNIP 1.673
Scopus rating (2001): SJR 1.442 SNIP 1.39
Scopus rating (2000): SJR 1.246 SNIP 0.714
Scopus rating (1999): SJR 1.381 SNIP 0.838
Original language: English
DOIs:
10.1364/OE.22.029398

Bibliographical note
Contribution: organisation=orc,FACT1=1
Portfolio EDEND: 2014-12-16
Publisher name: Optical Society of America
Source: researchoutputwizard
Source-ID: 1520
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 › Article

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
High power semiconductor disk laser with a semiconductor-dielectric-metal compound mirror

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

Publication information
Journal: APPLIED PHYSICS LETTERS
Volume: 104
Issue number: 10
Article number: 101110
ISSN (Print): 0003-6951
Ratings:
Scopus rating (2016): CiteScore 2.67 SJR 1.132 SNIP 0.996
Scopus rating (2015): SJR 1.085 SNIP 0.983 CiteScore 2.47
Scopus rating (2014): SJR 1.799 SNIP 1.462 CiteScore 3.25
Scopus rating (2013): SJR 2.149 SNIP 1.652 CiteScore 3.77
Scopus rating (2012): SJR 2.554 SNIP 1.754 CiteScore 3.76
Scopus rating (2011): SJR 2.805 SNIP 1.94 CiteScore 4.04
Scopus rating (2010): SJR 2.926 SNIP 1.789
Scopus rating (2009): SJR 2.857 SNIP 1.848
Scopus rating (2008): SJR 2.934 SNIP 1.83
Scopus rating (2007): SJR 3.039 SNIP 1.913
Scopus rating (2006): SJR 3.457 SNIP 2.288
Scopus rating (2005): SJR 3.709 SNIP 2.382
Scopus rating (2004): SJR 3.904 SNIP 2.38
Scopus rating (2003): SJR 3.765 SNIP 2.27
Scopus rating (2002): SJR 3.917 SNIP 2.365
Scopus rating (2001): SJR 4.111 SNIP 2.212
Scopus rating (2000): SJR 4.277 SNIP 2.013
Scopus rating (1999): SJR 4.35 SNIP 2.11
Original language: English
DOIs:
10.1063/1.4868535

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2014-04-29<br/>Publisher name: American Institute of Physics
High Power Wafer-Fused Flip Chip Semiconductor Disk Laser at 1.27 μm

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

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

Incorporation model of N into GaInNAs alloys grown by radio-frequency plasma-assisted molecular beam epitaxy

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

Publication information
Journal: Journal of Applied Physics
Volume: 116
Article number: 213101
ISSN (Print): 0021-8979
Scopus ratings:
- CiteScore 2016: 1.72
- SJR 2016: 0.632
- SNIP 2016: 0.815
- CiteScore 2015: 0.618
- SJR 2015: 0.84
- SNIP 2015: 1.57
- CiteScore 2014: 1.005
- SJR 2014: 1.18
- SNIP 2014: 2.04
- CiteScore 2013: 1.165
- SJR 2013: 1.317
- SNIP 2013: 2.24
- CiteScore 2012: 1.305
- SJR 2012: 1.294
- SNIP 2012: 2.13
- CiteScore 2011: 1.373
- SJR 2011: 1.318
- SNIP 2011: 2.24
- CiteScore 2010: 1.47
- SJR 2010: 1.195
- SNIP 2010: 1.238
- CiteScore 2009: 1.518
- SJR 2009: 1.238
- SNIP 2009: 1.338
- CiteScore 2008: 1.667
- SJR 2008: 1.395
- SNIP 2008: 1.395
- CiteScore 2007: 1.947
- SJR 2007: 1.649
- SNIP 2007: 1.627
- CiteScore 2006: 2.034
- SJR 2006: 1.602
- SNIP 2006: 1.525
- CiteScore 2005: 2.225
- SJR 2005: 1.674
- SNIP 2005: 1.517
DOIs: 10.1063/1.4903318
Influence of powder composition and manufacturing method on electrical and chromium barrier properties of atmospheric plasma sprayed spinel coatings prepared from MnCo2O4 and Mn2CoO4 + Co powders on Crofer 22 APU interconnectors

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Materials Science, Optoelectronics Research Centre, Engineering materials science and solutions (EMASS), Frontier Photonics
Number of pages: 12
Pages: 17246-17257
Publication date: 2014
Peer-reviewed: Yes

Publication information
Volume: 39
Issue number: 30
ISSN (Print): 0360-3199
Ratings:
Scopus rating (2016): CiteScore 3.74 SJR 1.142 SNIP 1.286
Scopus rating (2015): SJR 1.294 SNIP 1.319 CiteScore 3.46
Scopus rating (2014): SJR 1.212 SNIP 1.494 CiteScore 3.54
Scopus rating (2013): SJR 1.278 SNIP 1.467 CiteScore 3.38
Scopus rating (2012): SJR 1.515 SNIP 1.729 CiteScore 3.96
Scopus rating (2011): SJR 1.456 SNIP 1.837 CiteScore 4.42
Scopus rating (2010): SJR 1.589 SNIP 1.871
Scopus rating (2009): SJR 1.333 SNIP 1.885
Scopus rating (2008): SJR 1.401 SNIP 2.096
Scopus rating (2007): SJR 1.279 SNIP 2.201
Scopus rating (2006): SJR 1.073 SNIP 2.161
Scopus rating (2005): SJR 1.107 SNIP 1.787
Scopus rating (2004): SJR 1.225 SNIP 1.626
Scopus rating (2003): SJR 1.003 SNIP 1.319
Scopus rating (2002): SJR 0.763 SNIP 1.157
Scopus rating (2001): SJR 0.487 SNIP 1.185
Scopus rating (2000): SJR 0.518 SNIP 0.866
Scopus rating (1999): SJR 0.382 SNIP 0.897
Original language: English
DOI: 10.1016/j.ijhydene.2014.08.016

Influence of substrate contamination, web handling, and pretreatments on the barrier performance of aluminum oxide atomic layer-deposited BOPP film

Bibliographical note
Contribution: organisation=mol,FACT1=0.9
Contribution: organisation=orc,FACT2=0.1
Portfolio EDEND: 2014-10-30
Publisher name: Elsevier
Source: researchoutputwizard
Source-ID: 1308
Research output: Scientific - peer-review › Article
Life Cycle Assessment on Personal Protective Equipments

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Materials Science
Authors: Fatarella, E., Parisi, L., Varheenmaa, M., Talvenmaa, P., Pavlidou, S.
Number of pages: 8
Pages: 1-8
Publication date: 2014

Host publication information
Title of host publication: Ambience14&10i3, Tampere Hall, Tampere, Finland 7-9 September 2014
Place of publication: Tampere
Publisher: Tampere University of Technology
Editor: Varheenmaa, M.

Publication series
Name: Proceedings of Ambience, Scientific Conference for Smart Textiles
Publisher: Tampere University of Technology
No.: 1
ISSN (Print): 2342-4540

Bibliographical note
Magnetotransport study on as-grown and annealed n- and p-type modulation-doped GaInNAs/GaAs strained quantum well structures

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Dönmez, Ö., Sarcan, F., Erol, A., Gunes, M., Cetin Arikan, M., Puustinen, J., Guina, M.
Number of pages: 6
Pages: 1-6
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Nanoscale Research Letters
Volume: 9
Article number: 141
ISSN (Print): 1931-7573
Ratings:
Scopus rating (2016): SJR 0.589 SNIP 0.746 CiteScore 2.15
Scopus rating (2015): SJR 0.538 SNIP 0.653 CiteScore 1.69
Scopus rating (2014): SJR 0.748 SNIP 1.019 CiteScore 2.15
Scopus rating (2013): SJR 0.79 SNIP 0.967 CiteScore 2.23
Scopus rating (2012): SJR 1.049 SNIP 1.073 CiteScore 2.58
Scopus rating (2011): SJR 1.04 SNIP 1.124 CiteScore 2.88
Scopus rating (2010): SJR 1.062 SNIP 1.007
Scopus rating (2009): SJR 1.063 SNIP 1.01
Scopus rating (2008): SJR 0.828 SNIP 0.632
Scopus rating (2007): SJR 1.458 SNIP 0.71
Original language: English
DOIs:

Bibliographical note
Contribution: organisation=orc,FACT1=1
Portfolio EDEND: 2014-04-29
Publisher name: SpringerOpen

Modeling of MBE-Grown GaInNAs Solar Cells

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre
Authors: Tukiainen, A., Aho, A., Polojärvi, V., Guina, M.
Number of pages: 4
Pages: 1-4
Publication date: 2014

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

Publication series
Moth eye antireflection coated GaInP/GaAs/GaInNAs solar cell

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

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

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

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2014-12-31<br/>Publisher name: European Space Agency
Source: researchoutputwizard
Source-ID: 1646
Research output: Scientific - peer-review › Conference contribution

Multifunctional superhydrophobic nanoparticle coatings for cellulose-based substrates by liquid flame spray

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

Publication information
Journal: Materia
Issue number: 1
ISSN (Print): 1459-9694
Original language: Finnish
Links:
http://www.vuorimiesyhdistys.fi/sites/default/files/materia/pdf/Materia%201-2014_0.pdf
Nanoparticle Depositon on Packaging Materials by Liquid Flame Spray: Generation of Superhydrophilic and Superhydrophobic Coatings

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Materials Science, Department of Physics
Authors: Teisala, H., Tuominen, M., Aromaa, M., Stepien, M., Mäkelä, J. M., Saarinen, J. J., Toivakka, M., Kuusipalo, J.
Number of pages: 13
Pages: 331-343
Publication date: 2014

Host publication information
Title of host publication: Recent Advances in Adhesion Science and Technology
Place of publication: Boca Raton
Publisher: CRC Press
Editors: Gutowski, W. (., Dodiuk, H.
ISBN (Print): 978-90-04-20173-6

Negative and positive magnetoresistance in GaInNAs/GaAs modulation-doped quantum well structures

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Nutku, F., Donmez, O., Sarcan, F., Erol, A., Puustinen, J., Arikan, M., Guina, M.
Number of pages: 7
Pages: 1-7
Publication date: 2014
Peer-reviewed: Yes

Publication information
ISSN (Print): 0947-8396
Ratings:
Scopus rating (2016): CiteScore 1.52
Scopus rating (2015): CiteScore 1.38
Scopus rating (2014): CiteScore 1.74
Scopus rating (2013): CiteScore 1.75
Scopus rating (2012): CiteScore 1.71
Scopus rating (2011): CiteScore 1.77
Original language: English
DOIs:
10.1007/s00339-014-8852-y
Paper-based microfluidics: Fabrication technique and dynamics of capillary driven surface flow

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Materials Science, Department of Physics, Engineering materials science and solutions (EMASS)
Authors: Songok, J., Tuominen, M., Teisala, H., Haapanen, J., Mäkelä, J. M., Kuusipalo, J., Toivakka, M.
Number of pages: 7
Pages: 20060-20066
Publication date: 2014
Peer-reviewed: Yes

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

Bibliographical note
Contribution: organisation=orc,FACT1=1
Contribution: organisation=mol,FACT1=0.5
Contribution: organisation=fys,FACT2=0.5
Portfolio EDEND: 2014-12-30
Publisher name: American Chemical Society
Source: researchoutputwizard
Source-ID: 1538
Research output: Scientific - peer-review › Article

Performance assessment of multijunction solar cells incorporating GaInNAsSb

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Aho, A., Tukiainen, A., Polojarvi, V., Guina, M.
Polarization switching and bistability in a 1300 nm spin-VCSEL Subject to Circularly Polarized Optical Injection

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

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

Publication series
Name: IEEE Photonics Conference
DOIs:
10.1109/IPCon.2014.6995228
Links:
http://www.ipc-ieee.org/

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

Post-mortem evaluation of oxidized atmospheric plasma sprayed Mn-Co-Fe oxide spinel coatings on SOFC interconnectors
Properties of GaAsBi with Bi-rich clusters

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Optoelectronics Research Centre
Authors: Puustinen, J., Wu, M., Luna, E., Hilska, J., Guina, M.
Number of pages: 1
Pages: 58-58
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: 1315
Research output: Scientific › Conference contribution

Pulsed high-power yellow-orange VECSEL
We report on the development of a pulsed high-power frequency doubled vertical-external-cavity surface-emitting laser (VECSEL) with a peak output power of 14 W and emission spectrum near 588 nm. The semiconductor gain chip was grown by molecular beam epitaxy and comprised 10 GaInAs quantum wells. The gain structure was designed to be antiresonant at 1180 nm. The fundamental wavelength was frequency doubled to the yellow-orange spectral range using a 10-mm long critically phase matched lithium triborate nonlinear crystal, situated at the mode waist of the V-shaped laser cavity. The emission spectrum was narrowed down to FWHM of < 0.2 nm by employing a 1.5 mm birefringent filter and a 100-μm-thick etalon inside the cavity. By directly modulating the pump laser of the VECSEL, we were able to produce pulse widths down to 570 ns with average and peak output power of 81 mW and 14 W, respectively. The repetition rate was kept constant at 10 kHz throughout the measurements. The maximum peak power obtained was pump power limited. In comparison, at the same coolant temperature, a maximum of 8.5 W was achieved in continuous wave. The maximum optical-to-optical conversion efficiency (absorbed peak pump power to peak output power) was calculated to be 20-21 %.

© 2014 SPIE.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Research group: Semiconductor Technology and Applications, Frontier Photonics
Authors: Kantola, E., Leinonen, T., Ranta, S., Tavast, M., Guina, M.
Publication date: 2014

Host publication information
Volume: 9134
Publisher: SPIE
Article number: 91340Z
Review on Liquid Flame Spray in paper converting: Multifunctional superhydrophobic nanoparticle coatings

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

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

Publication information
Volume: 29
Issue number: 4
ISSN (Print): 0283-2631
Ratings:
Scopus rating (2016): CiteScore 1.2 SJR 0.385 SNIP 0.652
Scopus rating (2015): SJR 0.375 SNIP 0.787 CiteScore 0.91
Scopus rating (2014): SJR 0.444 SNIP 0.823 CiteScore 0.99
Scopus rating (2013): SJR 0.389 SNIP 0.684 CiteScore 0.71
Scopus rating (2012): SJR 0.628 SNIP 1.281 CiteScore 1.13
Scopus rating (2011): SJR 0.582 SNIP 0.902 CiteScore 0.78
Scopus rating (2010): SJR 0.658 SNIP 0.764
Scopus rating (2009): SJR 1.167 SNIP 0.984
Scopus rating (2008): SJR 0.928 SNIP 0.857
Scopus rating (2007): SJR 2.018 SNIP 1.035
Sedimentation stability and rheological properties of ionic liquid-based bidisperse magnetorheological fluids

The sedimentation stability and rheological properties of ionic liquid-based magnetorheological fluids comprising a mixture of micron- and nano-sized particles were experimentally studied. Three different fluids with the same total particle concentration of 15 vol% were prepared for testing: one containing only microparticles and two others in which 5 or 10 wt% of the microparticles were replaced by nanoparticles. The nanoparticles were surface stabilized against oxidation. For comparison purposes, silicon oil-based magnetorheological fluids with similar solid fractions were also prepared and tested. The results indicate that, with ionic liquid as a carrier fluid, the addition of nanoparticles at 10 wt% reduces the sedimentation rate almost by an order of magnitude from that without nanoparticles, while the reduction in the dynamic yield stress is only marginal. The ionic liquid-based fluids also had a better dispersion of particles.

General information

State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Mechanical Engineering and Industrial Systems, Department of Materials Science, Engineering materials science and solutions (EMASS)
Authors: Jönkkäri, I., Isakov, M., Syrjälä, S.
Number of pages: 10
Pages: 2256-2265
Publication date: 2014
Peer-reviewed: Yes

Publication information

Journal: Journal of Intelligent Material Systems and Structures
Volume: 26
Issue number: 16
ISSN (Print): 1045-389X
Ratings:

Scopus rating (2016): SJR 0.707 SNIP 1.141 CiteScore 2.02
Scopus rating (2015): SJR 0.891 SNIP 1.584 CiteScore 2.37
Scopus rating (2014): SJR 1.045 SNIP 1.811 CiteScore 2.54
Scopus rating (2013): SJR 1.03 SNIP 1.981 CiteScore 2.84
Scopus rating (2012): SJR 1.025 SNIP 1.579 CiteScore 1.87
Scopus rating (2011): SJR 1.054 SNIP 1.743 CiteScore 2.06
Scopus rating (2010): SJR 0.864 SNIP 1.452
Scopus rating (2009): SJR 0.743 SNIP 1.291
Scopus rating (2008): SJR 1.114 SNIP 1.432
Selective morphologies of MgO via nanoconfinement on γ-Al2O3 and reduced graphite oxide (rGO): improved CO2 capture capacity at elevated temperatures

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

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

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Optoelectronics Research Centre
Authors: Leinonen, T., Chen, M., Alford, W. J., Shirakawa, A., Fetzer, G. J., Sandolphon, A., Tavast, M., Ranta, S., Guina, M.
Number of pages: 1
Pages: 30-30
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
Invited talk

Semiconductor disk laser with a semiconductor dielectric-metal mirror

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

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

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

Bibliographical note
Talk TuR3-16

Talk TuR3-16

Talk TuR3-16

Talk TuR3-16
Single site-controlled quantum dot in micropillar cavity

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Optoelectronics Research Centre
Authors: Hakkarainen, T. V., Tommila, J., Belykh, V., Heinonen, E., Schramm, A., Guina, M.
Number of pages: 1
Pages: 17-17
Publication date: 2014

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

Publication series
Name: Optics and Photonics Days

Bibliographical note
Oral, Session 3, Integrated optics<br>Contribution: organisation=orc,FACT1=1<br>Portfolio EDEND: 2014-08-31<br>Publisher name: Finnish Optical Society
Source: researchoutputwizard
Source-ID: 393
Research output: Scientific › Conference contribution

Surface modification of thin film composite polyamide membrane using atomic layer deposition method

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

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

Original language: English
DOIs:
10.1016/j.memsci.2013.09.005

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

Surface Modifications and Analysis Methods at Molecular Level

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

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

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

Synthesis and Characterization of Layered Tin Monoxide Thin Films with Monocrystalline Structure on III-V Compound Semiconductor

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Number of pages: 5
Pages: 1-5
The effect of test parameters in the impact resistance of a stainless steel/rubber/composite hybrid structure

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Materials Science, Computational Science X (CompX), Engineering materials science and solutions (EMASS)
Authors: Sarlin, E., Lindroos, M., Apostol, M., Kuokkala, V., Vuorinen, J., Lepistö, T., Vippola, M.
Number of pages: 7
Pages: 469-475
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Composite Structures
Volume: 113
ISSN (Print): 0263-8223
Ratings:
Scopus rating (2016): CiteScore 4.45 SJR 2.13 SNIP 2.033
Scopus rating (2015): SJR 2.247 SNIP 2.236 CiteScore 4.25
Scopus rating (2014): SJR 2.331 SNIP 2.524 CiteScore 4.03
Scopus rating (2013): SJR 2.017 SNIP 2.937 CiteScore 3.7
Scopus rating (2012): SJR 1.867 SNIP 2.838 CiteScore 2.85
Scopus rating (2011): SJR 1.683 SNIP 2.581 CiteScore 2.68
Scopus rating (2010): SJR 1.583 SNIP 2.367
Scopus rating (2009): SJR 1.652 SNIP 2.076
Scopus rating (2008): SJR 1.447 SNIP 1.761
Scopus rating (2007): SJR 1.336 SNIP 2.006
Scopus rating (2006): SJR 1.08 SNIP 1.894
Scopus rating (2005): SJR 1.233 SNIP 1.647
Scopus rating (2004): SJR 1.022 SNIP 1.484
Scopus rating (2003): SJR 0.977 SNIP 1.101
Scopus rating (2002): SJR 1.347 SNIP 0.958
Scopus rating (2001): SJR 0.695 SNIP 1.151
Scopus rating (2000): SJR 0.896 SNIP 0.879
Scopus rating (1999): SJR 0.864 SNIP 0.868
Original language: English
Electronic versions:
Thermal spray coating processes

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Materials Science, Engineering materials science and solutions (EMASS)
Authors: Vuoristo, P.
Number of pages: 47
Pages: 229-276
Publication date: 2014

Host publication information
Title of host publication: Comprehensive materials processing, 1st edition Volume 4: Coatings and films
Publisher: Elsevier

Bibliographical note
Contribution: organisation=mol,FACT1=1<br/>Portfolio EDEND: 2014-05-27<br/>Publisher name: Elsevier
Source: researchoutputwizard
Source-ID: 1466
Research output: Scientific - peer-review › Article

The role of surface modification by photosphating in corrosion protection of sintered Nd-Fe-B magnets

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Department of Materials Science, Research group: Materials Characterization
Authors: Isotahdon, E., Huttunen-Saarivirta, E., Kuokkala, V.
Number of pages: 10
Publication date: 2014

Host publication information
Title of host publication: EUROCORR 2014 European Corrosion Congress, 8-12 September 2014 Pisa Italy
Place of publication: Frankfurt am Main
Publisher: DECHEMA and AIM - Associazione Italiana
ISBN (Print): 978-3-89746-159-8

Bibliographical note
Contribution: organisation=mol,FACT1=1<br/>Portfolio EDEND: 2014-10-02
Source: researchoutputwizard
Source-ID: 548
Research output: Scientific › 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
Wafer fused, wavelength controlled 1300 nm vertical external cavity surface emitting lasers

Yarn to Fabric: Intelligent Textiles

1180 nm VECSEL with output power beyond 20 W
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: Ranta, S., Tavast, M., Leinonen, T., Van Lieu, N., Fetzer, G., Guina, M.
Number of pages: 2
Pages: 59-60
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Electronics Letters
Volume: 49
Issue number: 1
ISSN (Print): 0013-5194
Ratings:
Scopus rating (2016): CiteScore 1.35 SJR 0.442 SNIP 0.882
Scopus rating (2015): SJR 0.497 SNIP 1.011 CiteScore 1.31
Scopus rating (2014): SJR 0.522 SNIP 1.061 CiteScore 1.31
Scopus rating (2013): SJR 0.59 SNIP 1.155 CiteScore 1.45
Scopus rating (2012): SJR 0.631 SNIP 1.161 CiteScore 1.45
Scopus rating (2011): SJR 0.634 SNIP 1.098 CiteScore 1.44
Scopus rating (2010): SJR 0.637 SNIP 1.011
Scopus rating (2009): SJR 0.728 SNIP 1.072
Scopus rating (2008): SJR 0.843 SNIP 0.957
Scopus rating (2007): SJR 0.924 SNIP 1.169
Scopus rating (2006): SJR 0.863 SNIP 1.192
Scopus rating (2005): SJR 1.048 SNIP 1.298
Scopus rating (2004): SJR 1.156 SNIP 1.354
Scopus rating (2003): SJR 1.372 SNIP 1.352
Scopus rating (2002): SJR 1.572 SNIP 1.202
Scopus rating (2001): SJR 1.591 SNIP 1.042
Scopus rating (2000): SJR 1.264 SNIP 0.951
Scopus rating (1999): SJR 1.443 SNIP 1.074
Original language: English
DOIs:
10.1049/el.2012.3450

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2013-07-29<br/>Publisher name: Institution of Engineering and Technology IET
Source: researchoutputwizard
Source-ID: 3215
Research output: Scientific - peer-review › Article
1 Watt from 1.56 µm Single Frequency Semiconductor Disk Laser

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

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

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

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2013-05-29<br/>Publisher name: Optical Society of America - OSA
Source: researchoutputwizard
Source-ID: 3227
Research output: Scientific - peer-review › Article

Actively Mode-Locked Semiconductor Disk Laser Using Vertical Cavity Modulator

General information
State: Published
Control of the absorption recovery time in GaSb SESAMs

Effect of neutron irradiation on the capacitance hysteresis in GaAs Schottky diodes with self-assembled InAs quantum dots
Effects of 7-MeV electron irradiation on photoluminescence from 1-eV GaInNAs-on-GaAs epilayers

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Pavelescu, E., Kudrawiec, R., Puustinen, J., Tukiainen, A., Guina, M.
Number of pages: 4
Pages: 347-350
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Journal of Luminescence
Volume: 136
ISSN (Print): 0022-3727
Ratings:
Scopus rating (2016): SJR 0.723 SNIP 1.14 CiteScore 2.61
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
Enhancement in photoluminescence from 1 eV GaInNAs epilayers subject to 7 MeV electron irradiation

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

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

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Royall, B., Mazzucato, S., Ketlhwaafetse, R., Balkan, N., Puustinen, J., Guina, M., Smith, A.
Number of pages: 4
Pages: 581-584
Publication date: 2013
Peer-reviewed: Yes

Publication information
Volume: 10
Issue number: 4
ISSN (Print): 1862-6351
Ratings:
Scopus rating (2016): CiteScore 0.82
Scopus rating (2015): CiteScore 0.72
Scopus rating (2014): CiteScore 0.69
Scopus rating (2013): CiteScore 0.77
Scopus rating (2012): CiteScore 0.68
Scopus rating (2011): CiteScore 0.66
Original language: English
DOIs:
10.1002/pssc.201200481

Growth and properties of crystalline barium oxide on the GaAs(100) substrate

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Number of pages: 4
Pages: 1-4
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: APPLIED PHYSICS LETTERS
Volume: 103
Article number: 191601
ISSN (Print): 0003-6951
Ratings:
Scopus rating (2016): CiteScore 2.67 SJR 1.132 SNIP 0.996
Scopus rating (2015): SJR 1.085 SNIP 0.983 CiteScore 2.47
High current generation in dilute nitride solar cells grown by molecular beam epitaxy

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

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

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

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2013-07-29<br/>Publisher name: SPIE
Source: researchoutputwizard
Source-ID: 1884
Research output: Scientific - peer-review › Conference contribution
High-efficiency yellow VECSEL with an output power of about 12 W

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Kantola, E., Leinonen, T., Ranta, S., Tavast, M., 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: researchoutputwizard
Source-ID: 2494
Research output: Scientific - peer-review › Conference contribution

High Power 1100 -1200 nm Semiconductor Disk Lasers

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Leinonen, T., Kantola, E., Ranta, S., Tavast, M., Korpijärvi, V., Guina, M.
Number of pages: 2
Pages: 1-2
Publication date: 2013

Host publication information
Title of host publication: The 10th Conference on Lasers and Electro-Optics Pacific Rim, CLEO-PR 2013, 30 June - 4 July 2013, Kyoto, Japan
Place of publication: Piscataway, NJ
Publisher: IEEE
ISBN (Print): 978-1-4673-6475-1
ISBN (Electronic): 978-1-4673-6476-8

Publication series
Name: Pacific Rim Conference on Lasers and Electro-Optics
DOIs: 10.1109/CLEOPR.2013.6600299

Bibliographical note
ThA2-1<br/>Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2013-10-29<br/>Publisher name: IEEE
Source: researchoutputwizard
Source-ID: 2764
Research output: Scientific - peer-review › Conference contribution

High Power 1178nm Single-Frequency MOPA Based on OP-SDL and PBGF

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Frontier Photonics
Number of pages: 2
High Power (23W) Vertical External-Cavity Surface-Emitting Laser emitting at 1180 nm

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Leinonen, T., Ranta, S., Tavast, M., Epstein, R., Fetzer, G., Sandalphon, N., Van Lieu, N., Guina, M.
Number of pages: 6
Pages: 1-6
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
DOI: 10.1117/12.2004904

Bibliographical note
Contribution: organisation=orc,FACT1=1
Portfolio EDEND: 2013-06-29
Publisher name: SPIE
Source-ID: 2765
Research output: Scientific - peer-review › Conference contribution

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

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

Host publication information
Impact of the non-planar morphology of pre-patterned substrates on the structural and electronic properties of embedded site-controlled InAs quantum dots

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Augmented Human Activities (AHA), Frontier Photonics
Authors: Hakkarainen, T. V., Luna, E., Schramm, A., Tommila, J., Guina, M.
Number of pages: 10
Pages: 1-10
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Journal of Applied Physics
Volume: 114
Article number: 174304
ISSN (Print): 0021-8979
Ratings:
Scopus rating (2016): CiteScore 1.72 SJR 0.632 SNIP 0.815
Scopus rating (2015): SJR 0.618 SNIP 0.84 CiteScore 1.57
Scopus rating (2014): SJR 1.005 SNIP 1.18 CiteScore 2.04
Scopus rating (2013): SJR 1.165 SNIP 1.317 CiteScore 2.24
Scopus rating (2012): SJR 1.305 SNIP 1.294 CiteScore 2.13
Scopus rating (2011): SJR 1.373 SNIP 1.318 CiteScore 2.24
Scopus rating (2010): SJR 1.47 SNIP 1.195
Scopus rating (2009): SJR 1.518 SNIP 1.238
Scopus rating (2008): SJR 1.667 SNIP 1.338
Scopus rating (2007): SJR 1.708 SNIP 1.395
Scopus rating (2006): SJR 1.947 SNIP 1.649
Scopus rating (2005): SJR 2.034 SNIP 1.627
Scopus rating (2004): SJR 2.097 SNIP 1.602
Scopus rating (2003): SJR 2.019 SNIP 1.525
Scopus rating (2002): SJR 2.225 SNIP 1.674
Scopus rating (2001): SJR 2.079 SNIP 1.554
Scopus rating (2000): SJR 2.338 SNIP 1.543
Scopus rating (1999): SJR 2.071 SNIP 1.517
Original language: English
DOIs:
10.1063/1.4828734

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2013-11-29<br/>Publisher name: American Institute of Physics
Source: researchoutputwizard
Source-ID: 2220
Research output: Scientific - peer-review › Article

Influence of nitrogen on hole effective mass and hole mobility in p-type modulation doped GaInNAs/GaAs quantum well structures

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Sarcan, F., Donmez, O., Erol, A., Guina, M., Arikan, C., Puustinen, J.
Number of pages: 4
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
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
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
Mode-locking of 2 µm Tm,Ho:YAG laser with GaInAs and GaSb-based SESAMs

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Yang, K., Heinecke, D., Paajaste, J., Kölbl, C., Dekorsy, T., Suomalainen, S., Guina, M.
Number of pages: 8
Pages: 4311-4318
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Optics Express
Volume: 21
Issue number: 4
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/OL.38.002289

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2013-07-29<br/>Publisher name: Optical Society of America OSA
Source: researchoutputwizard
Source-ID: 3216
Research output: Scientific - peer-review › Article

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2013-11-29<br/>Publisher name: Optical Society of America
Source: researchoutputwizard
Source-ID: 3763
Moth-eye antireflection coating fabricated by nanoimprint lithography on 1 eV dilute nitride solar cell

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

Publication information
Journal: Progress in Photovoltaics: Research and Applications
Volume: 21
Issue number: 5
ISSN (Print): 1062-7995
Ratings:
Scopus rating (2016): SJR 2.224 SNIP 2.694 CiteScore 6.54
Scopus rating (2015): SJR 2.78 SNIP 3.33 CiteScore 7.31
Scopus rating (2014): SJR 3.279 SNIP 3.874 CiteScore 7.7
Scopus rating (2013): SJR 3.974 SNIP 5.653 CiteScore 8.93
Scopus rating (2012): SJR 4.78 SNIP 5.082 CiteScore 6.81
Scopus rating (2011): SJR 3.251 SNIP 5.999 CiteScore 6.81
Scopus rating (2010): SJR 3.749 SNIP 4.317
Scopus rating (2009): SJR 3.18 SNIP 3.256
Scopus rating (2008): SJR 2.537 SNIP 2.473
Scopus rating (2007): SJR 1.711 SNIP 2.124
Scopus rating (2006): SJR 1.55 SNIP 2.881
Scopus rating (2005): SJR 1.774 SNIP 3.07
Scopus rating (2004): SJR 0.852 SNIP 1.671
Scopus rating (2003): SJR 0.763 SNIP 1.489
Scopus rating (2002): SJR 1.658 SNIP 1.742
Scopus rating (2001): SJR 1.651 SNIP 1.714
Scopus rating (2000): SJR 0.934 SNIP 1.567
Scopus rating (1999): SJR 0.673 SNIP 1.076
Original language: English
DOIs:
10.1002/pip.2191

Bibliographical note
Article first published online: 12 MAR 2012 : Ei vielä UT-numeroa 8.8.2013
Contribution: organisation=orc,FACT1=1
Publisher name: Wiley
Source: researchoutputwizard
Source-ID: 3551
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
Nanoscale surface properties of a Ni–Mn–Ga 10M magnetic shape memory alloy

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

Published in:
IEEE Photonics Technology Letters
Volume: 25
Issue number: 22
ISSN (Print): 1041-1135
Ratings:
Scopus rating (2016): CiteScore 2.52 SJR 1.018 SNIP 1.279
Scopus rating (2015): SJR 1.263 SNIP 1.327 CiteScore 2.62
Scopus rating (2014): SJR 1.461 SNIP 1.614 CiteScore 2.78
Scopus rating (2013): SJR 1.487 SNIP 1.547 CiteScore 2.95
Scopus rating (2012): SJR 1.623 SNIP 1.706 CiteScore 2.46
Scopus rating (2011): SJR 1.51 SNIP 2.012 CiteScore 2.48
Scopus rating (2010): SJR 1.474 SNIP 1.623
Scopus rating (2009): SJR 1.775 SNIP 1.804
Scopus rating (2008): SJR 2.081 SNIP 1.818
Scopus rating (2007): SJR 2.345 SNIP 1.566
Scopus rating (2006): SJR 2.112 SNIP 1.884
Scopus rating (2005): SJR 2.97 SNIP 2.454
Scopus rating (2004): SJR 3.286 SNIP 2.716
Scopus rating (2003): SJR 3.44 SNIP 2.467
Scopus rating (2002): SJR 3.566 SNIP 2.117
Scopus rating (2001): SJR 3.519 SNIP 1.678
Scopus rating (2000): SJR 2.345 SNIP 1.202
Scopus rating (1999): SJR 2.44 SNIP 1.302
Original language: English
DOIs:
10.1109/LPT.2013.2284920

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2013-10-29<br/>Publisher name: IEEE
Source: researchoutputwizard
Source-ID: 3225
Research output: Scientific - peer-review › Article
Optically Pumped Semiconductor Lasers for Precision Spectroscopic Applications

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Alford, W. J., Fetzer, G. J., Epstein, R. J., Sandalphon, N., Van Lieu, N., Ranta, S., Tavast, M., Leinonen, T., Guina, M.
Number of pages: 9
Pages: 719-727
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: IEEE journal of quantum electronics
Volume: 49
Issue number: 8
ISSN (Print): 0018-9197

Scopus rating (2016): SJR 0.738 SNIP 1.103 CiteScore 1.74
Scopus rating (2015): SJR 0.966 SNIP 1.218 CiteScore 1.99
Scopus rating (2014): SJR 1.074 SNIP 1.227 CiteScore 1.95
Scopus rating (2013): SJR 1.333 SNIP 1.592 CiteScore 2.53
Scopus rating (2012): SJR 1.361 SNIP 1.577 CiteScore 2.19
Scopus rating (2011): SJR 1.296 SNIP 1.557 CiteScore 2.29
Scopus rating (2010): SJR 1.417 SNIP 1.695
Scopus rating (2009): SJR 1.875 SNIP 1.964
Scopus rating (2008): SJR 1.782 SNIP 1.738
Scopus rating (2007): SJR 2.09 SNIP 1.713
Scopus rating (2006): SJR 1.829 SNIP 1.86
Scopus rating (2005): SJR 2.821 SNIP 2.3
Scopus rating (2004): SJR 2.888 SNIP 2.512
Scopus rating (2003): SJR 2.687 SNIP 2.154
Scopus rating (2002): SJR 2.189 SNIP 1.924
Scopus rating (2001): SJR 2.518 SNIP 1.725
Scopus rating (2000): SJR 1.92 SNIP 1.344
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
Portfolio EDEND: 2013-09-29
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
AF1A.2
Contribution: organisation=orc,FACT1=1
Portfolio EDEND: 2013-11-29
Publisher name: Optical Society of America
Physics and Applications of Novel Gain Materials: Preface

General information
State: Published
Ministry of Education publication type: B1 Article in a scientific magazine
Organisations: Optoelectronics Research Centre
Authors: Calvez, S., Rorison, J., Guina, M., Alexandropoulos, D., Balkan, N.
Number of pages: 2
Pages: 554-555
Publication date: 2013
Peer-reviewed: No

Publication information
Volume: 10
Issue number: 4
ISSN (Print): 1862-6351
Ratings:
Scopus rating (2016): CiteScore 0.82
Scopus rating (2015): CiteScore 0.72
Scopus rating (2014): CiteScore 0.69
Scopus rating (2013): CiteScore 0.77
Scopus rating (2012): CiteScore 0.68
Scopus rating (2011): CiteScore 0.66
Original language: English
DOIs:
10.1002/pssc.201360160

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2013-12-29<br/>Publisher name: Wiley

Properties of InAs Quantum Dots in Nanoimprint Lithography Patterned GaAs Pits

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

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

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

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

Silanointiparametrien vaikutus sähkökemiallisesti passivoidun austeniittisen teräksen pinnalle rakentuvan biofunktionaalisen seossilaaniohutkalvon koostumukseen
This thesis examines the chemical composition of a mixed silane thin film synthesized on electrochemically passivated AISI 316L-stainless steel. Silane thin films can be used to enhance the biocompatibility of stainless steel and to create surface functionalities that promote adsorption of biomolecules. Such hybrid materials made of steel and organic coatings can be utilized in e.g. medical implants and tissue engineering.

The goal of this work was to develop deposition equipment needed for the synthesis of silane thin films in order to improve the rate and reproducibility of the sample preparation. The equipment was used to investigate the effect of silanization parameters such as the composition of the silane solution, the hydrolysis time and the silanization time on the structure of the self-assembled thin film. The silane molecules used in this study were amine terminated (3-aminopropyl)trimethoxysilane (APS) and thiol terminated (3-mercaptopropyl)trimethoxysilane (MPS).

The silanization process was conducted as a liquid phase deposition in atmospheric pressure, which enables the method to be easily adapted to commercial applications. On the other hand, the measurements were performed in ultra-high vacuum utilizing both synchrotron radiation induced and conventional X-ray photoelectron spectroscopy (XPS). The acquired spectra enabled conclusions to be made on the chemical composition and thickness of the silane films. They also provided information on the ratio and orientation of the functional groups.

According to the results, the employed silanization process enables the reproducible manufacturing of approximately one monolayer thick silane films. In addition, the amount of surface functionalities can be adjusted by modifying either the silane concentration in the hydrolysis solution or the silanization time. However, changing the hydrolysis time only affects the chemical bonding between the silane molecules and steel surface, not the total amount of functional groups. Based on the measurements with varying surface sensitivities, it was possible to conclude that the majority of functional groups point outwards. This is an important result considering the adsorption of biomolecules on the surface.

This study found that the hydrolysis rate of different silane species shows considerable variation despite the similar basic structure of the molecules. In the future, the hydrolysis behaviour should be investigated more carefully in the liquid phase. This might help to understand the hydrolysis reactions and also enhance the repeatability of the sample preparation.
Size-dependent properties of single InAs quantum dots grown in nanoinprint lithography patterned GaAs pits

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

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

Bibliographical note
Contribution: organisation=orc, FACT1=1<br/>Portfolio EDEND: 2013-06-29<br/>Publisher name: Institute of Physics Publishing IOP
Source: researchoutputwizard
Temperature dependence of photoluminescence for site-controlled InAs/GaAs quantum dot chains

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Augmented Human Activities (AHA), Frontier Photonics
Authors: Hakkarainen, T., Schramm, A., Luna, E., Tommila, J., Guina, M.
Number of pages: 5
Pages: 470-474
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Journal of Crystal Growth
Volume: 378
ISSN (Print): 0022-0248
Ratings: Scopus rating (2016): SJR 0.735 SNIP 1.175 CiteScore 1.69
Scopus rating (2015): SJR 0.716 SNIP 1.174 CiteScore 1.63
Scopus rating (2014): SJR 0.795 SNIP 1.184 CiteScore 1.69
Scopus rating (2013): SJR 0.831 SNIP 1.221 CiteScore 1.78
Scopus rating (2012): SJR 0.956 SNIP 1.246 CiteScore 1.68
Scopus rating (2011): SJR 0.96 SNIP 1.425 CiteScore 1.89
Scopus rating (2010): SJR 1.163 SNIP 1.206
Scopus rating (2009): SJR 1.068 SNIP 1.202
Scopus rating (2008): SJR 1.161 SNIP 1.236
Scopus rating (2007): SJR 1.237 SNIP 1.32
Scopus rating (2006): SJR 1.001 SNIP 1.211
Scopus rating (2005): SJR 1.105 SNIP 1.403
Scopus rating (2004): SJR 1.211 SNIP 1.292
Scopus rating (2003): SJR 0.956 SNIP 1.11
Scopus rating (2002): SJR 1.16 SNIP 1.262
Scopus rating (2001): SJR 1.108 SNIP 1.067
Scopus rating (2000): SJR 1.044 SNIP 1.045
Scopus rating (1999): SJR 1.404 SNIP 1.003
Original language: English
DOIs:
10.1016/j.jcrysgro.2012.12.099

Bibliographical note
Contribution: organisation=orc,FACT1=1<br/>Portfolio EDEND: 2013-07-29<br/>Publisher name: Elsevier
Source: researchoutputwizard
Source-ID: 2221
Research output: Scientific - peer-review › Article

Variation of lattice constant and cluster formation in GaAsBi

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Augmented Human Activities (AHA), Frontier Photonics
Authors: Puustinen, J., Wu, M., Luna, E., Schramm, A., Laukkanen, P., Laitinen, M., Sajavaara, T., Guina, M.
Number of pages: 5
Pages: 1-5
Publication date: 2013
Peer-reviewed: Yes
1 W at 785 nm from a frequency-doubled wafer-fused semiconductor disk laser

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Rantamäki, A., Rautiainen, J., Lyytikäinen, J., Sirbu, A., Mereuta, A., Kapon, E., Okhotnikov, O. G.
Pages: 9046-9051
Publication date: 2012
Peer-reviewed: Yes

Publication information
Journal: Optics Express
Volume: 20
Issue number: 8
ISSN (Print): 1084-4087
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
200 GHz 1 W semiconductor disc laser emitting 800 fs pulses

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Saarinen, E., Rantamäki, A., Chamorovskiy, A., Okhotnikov, O. G.
Pages: 1355-1356
Publication date: 2012
Peer-reviewed: Yes

Publication information
Journal: Electronics Letters
Volume: 48
Issue number: 21
ISSN (Print): 0013-5194
Ratings:
Scopus rating (2016): CiteScore 1.35 SJR 0.442 SNIP 0.882
Scopus rating (2015): SJR 0.497 SNIP 1.011 CiteScore 1.31
Scopus rating (2014): SJR 0.522 SNIP 1.061 CiteScore 1.31
Scopus rating (2013): SJR 0.59 SNIP 1.155 CiteScore 1.45
Scopus rating (2012): SJR 0.631 SNIP 1.161 CiteScore 1.45
Scopus rating (2011): SJR 0.634 SNIP 1.098 CiteScore 1.44
Scopus rating (2010): SJR 0.637 SNIP 1.011
Scopus rating (2009): SJR 0.728 SNIP 1.072
Scopus rating (2008): SJR 0.843 SNIP 0.957
Scopus rating (2007): SJR 0.924 SNIP 1.169
Scopus rating (2006): SJR 0.863 SNIP 1.192
Scopus rating (2005): SJR 1.048 SNIP 1.298
Scopus rating (2004): SJR 1.156 SNIP 1.354
Scopus rating (2003): SJR 1.372 SNIP 1.352
Scopus rating (2002): SJR 1.572 SNIP 1.202
Scopus rating (2001): SJR 1.591 SNIP 1.042
Scopus rating (2000): SJR 1.264 SNIP 0.951
Scopus rating (1999): SJR 1.443 SNIP 1.074
Original language: English
200 GHz 800 fs 1 W Semiconductor Disk Laser Mode-Locked by a SESAM with a Diamond Heat Spreader

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Research group: Ultrafast and intense lasers
Authors: Saarinen, E. J., Rantamäki, A., Chamorovskiy, A., Okhotnikov, O. G.
Publication date: 2012

Host publication information
Title of host publication: 15th International Conference Laser Optics 2012, St. Petersburg, 25-29 June 2012
Research output: Scientific - peer-review › Conference contribution

2 W 1.2 µm flip-chip quantum dot semiconductor disk laser

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Optoelectronics Research Centre, Research group: Ultrafast and intense lasers, Innolume GmbH, Dortmund 44263, Germany, Photonics and Nanoscience Group, School of Engineering, Physics and Mathematics, University of Dundee, Dundee DD1 4HN, U.K.
Authors: Rantamäki, A., Rautiainen, J. T., Toikkanen, L. J., Krestnikov, I., Butkus, M., Rafailov, E. U., Okhotnikov, O.
Publication date: 2012

Host publication information
Title of host publication: 15th International Conference Laser Optics 2012, St. Petersburg, 25-29 June 2012
Research output: Scientific - peer-review › Conference contribution

4.6-W Single Frequency Semiconductor Disk Laser With < 75-kHz Linewidth

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Rantamäki, A., Chamorovskiy, A., Lyytikäinen, J., Okhotnikov, O. G.
Pages: 1378-1380
Publication date: 2012
Peer-reviewed: Yes

Publication information
Journal: IEEE Photonics Technology Letters
Volume: 24
Issue number: 16
ISSN (Print): 1041-1135
Ratings:
Scopus rating (2016): CiteScore 2.52 SJR 1.018 SNIP 1.279
Scopus rating (2015): SJR 1.263 SNIP 1.327 CiteScore 2.62
Scopus rating (2014): SJR 1.461 SNIP 1.614 CiteScore 2.78
Scopus rating (2013): SJR 1.487 SNIP 1.547 CiteScore 2.95
Scopus rating (2012): SJR 1.623 SNIP 1.706 CiteScore 2.46
Scopus rating (2011): SJR 1.51 SNIP 2.012 CiteScore 2.48
Scopus rating (2010): SJR 1.474 SNIP 1.623
Scopus rating (2009): SJR 1.775 SNIP 1.804
Flip Chip Quantum-Dot Semiconductor Disk Laser at 1200 nm

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Optoelectronics Research Centre, Frontier Photonics
Authors: Rantamäki, A., Rautiainen, J., Toikkanen, L., Krestnikov, I., Butkus, M., Rafailov, E. U., Okhotnikov, O. G.
Pages: 1292-1294
Publication date: 2012
Peer-reviewed: Yes

Publication information
Journal: IEEE Photonics Technology Letters
Volume: 24
Issue number: 15
Article number: 12817485
ISSN (Print): 1041-1135
Ratings:
Scopus rating (2016): CiteScore 2.52 SJR 1.018 SNIP 1.279
Scopus rating (2015): SJR 1.263 SNIP 1.327 CiteScore 2.62
Scopus rating (2014): SJR 1.461 SNIP 1.614 CiteScore 2.78
Scopus rating (2013): SJR 1.487 SNIP 1.547 CiteScore 2.95
Scopus rating (2012): SJR 1.623 SNIP 1.706 CiteScore 2.46
Scopus rating (2011): SJR 1.51 SNIP 2.012 CiteScore 2.48
Scopus rating (2010): SJR 1.474 SNIP 1.623
Scopus rating (2009): SJR 1.775 SNIP 1.804
Scopus rating (2008): SJR 2.081 SNIP 1.818
Scopus rating (2007): SJR 2.345 SNIP 1.566
Scopus rating (2006): SJR 2.112 SNIP 1.884
Scopus rating (2005): SJR 2.97 SNIP 2.454
Scopus rating (2004): SJR 3.286 SNIP 2.716
Scopus rating (2003): SJR 3.44 SNIP 2.467
Scopus rating (2002): SJR 3.566 SNIP 2.117
Scopus rating (2001): SJR 3.519 SNIP 1.678
Scopus rating (2000): SJR 2.345 SNIP 1.202
Scopus rating (1999): SJR 2.44 SNIP 1.302
Original language: English
DOIs: 10.1109/LPT.2012.2204736
1.3 µm Raman-bismuth fiber amplifier pumped by semiconductor disk laser

General information
State: Published
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Scopus rating (2012): SJR 2.587 SNIP 2.145 CiteScore 3.85
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Scopus rating (2010): SJR 2.943 SNIP 2.466
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Scopus rating (2003): SJR 2.688 SNIP 2.193
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Effect of thermal management on the properties of saturable absorber mirrors in high-power mode-locked semiconductor disk lasers

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Organisations: Optoelectronics Research Centre
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Multiple gain cavity for power scaling in passively mode-locked semiconductor disk laser

Raman Fiber Oscillators and Amplifiers Pumped by Semiconductor Disk Lasers
The Impact of Thermal Management of Saturable Absorber on the Performance of Mode-Locked Semiconductor Disk Lasers

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

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Scopus rating (2014): SJR 2.349 SNIP 2.166 CiteScore 4.18
Scopus rating (2013): SJR 2.358 SNIP 2.226 CiteScore 4.38
Scopus rating (2012): SJR 2.587 SNIP 2.145 CiteScore 3.85
Scopus rating (2011): SJR 2.579 SNIP 2.606 CiteScore 4.04
Scopus rating (2010): SJR 2.943 SNIP 2.466
Scopus rating (2009): SJR 3.092 SNIP 2.669
Scopus rating (2008): SJR 3.195 SNIP 2.393
Scopus rating (2007): SJR 3.27 SNIP 2.032
Scopus rating (2006): SJR 3.233 SNIP 2.326
Scopus rating (2005): SJR 3.334 SNIP 2.379
Scopus rating (2004): SJR 2.833 SNIP 2.499
Scopus rating (2003): SJR 2.688 SNIP 2.193
Scopus rating (2002): SJR 1.547 SNIP 1.673
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Scopus rating (2000): SJR 1.246 SNIP 0.714
Scopus rating (1999): SJR 1.381 SNIP 0.838
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3 W of 650 nm red emission by frequency doubling of wafer-fused semiconductor disk laser

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Passively mode locked semiconductor disk laser using multiple gain elements

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