Broadband Nonlinear Signal Processing in Silicon Nanowires

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TuR3-10 Invited **15:00-15:30**

BOTTOM-UP PHOTONIC CRYSTAL CAVITIES LASER

D. Huffaker; Univ. of California; United States

Abstract is not available.

TuR3-11 Invited **15:30-16:00**

BROADBAND NONLINEAR SIGNAL PROCESSING IN SILICON NANOWIRES

K. Yvind; M. Pu; J. Hvam; H.Ch.H. Mulvad; H. Hu; H. Ji; M. Galili; P. Jeppesen; E. Palushani, A. Clausen, L. Oxenlowe; DTU Fotonik; Denmark

The fast non-linearity of silicon allows Tbit/s optical signal processing. By choosing suitable dimensions of silicon nanowires their dispersion can be tailored to ensure a high nonlinearity at power levels low enough to avoid significant two-photon abso We have fabricated low insertion and propagation loss silicon nanowires and use them to demonstrate the broadband capabilities of silicon.

TuR3-12 **16:00-16:15**

THE MODELING OF COMB SPECTRUM STABILITY IN QUANTUM DOT LASERS

A.V. Savelyev, M.V. Maximov, A.E. Zhukov; St. Petersburg Academic Univ.; Russia

A quantum dot laser (QDL) in the regime of continuous emission of broad spectrum is studied. It is argued that conventional theoretical approach can not explain experimentally observed spectrum stability i.e. uniform power distribution between modes and low intensity noise of individual modes. The theory of spatial interaction between modes in QDL is developed in order to discuss this contradiction.

TuR3-13 **16:15-16:30**

FAST MODULATORS OF HIGH OPTICAL POWER BASED ON MODE SWITCHING EFFECTS IN SEMICONDUCTOR LASERS

S.O.Slipchenko, A.A.Podoskin, A.Yu.Leshko, A.V.Rozhkov, N.A.Pikhtin, I.S.Tarasov; Ioffe Physical Technical Inst. RAS; Russia

Mode switching effects in semiconductor lasers based on asymmetric heterostructure with low internal optical losses have been investigated and physical principles of new type fast modulator of high optical power have been developed for the first time. Switching efficiency of 30 W/A, peak pulse output optical power of 10W with rise and fall time of 300ps was demonstrated.

TuR3-14 Invited **16:30-17:00**

QUANTUM DOT BASED DEVICES FOR BROADBAND EMITTERS AND AMPLIFIERS FOR BIOMEDICAL IMAGING

R.A. Hogg[1,2], S.J. Matcher3, N. Krstajic[3], D.T.D. Childs[1], M. Hugues[2], Z.Y. Zhang[1], N. Peyvast[1], M.A. Majid[1], P.D.L. Greenwood[1], S.C. Chen[1], K. Zhou[1], K.Kennedy[2], K.M. Groom[1], D. Livshits[4], A. Shkolnik[4], I. Krestnikov[4]; 1-Department of Electronic and Electrical Engineering, Univ. of Sheffield, UK; 2-EPSRC National Centre for III-V Technologies, Department of Electronic and Electrical Engineering, Univ. of Sheffield, UK; 3-Department of Materials Science and Engineering, Univ. of Sheffield, UK; 4-Innolume GmbH, Germany

Rrecent work on the development of quantum dot based superluminescent diodes and semiconductor optical amplifiers for imaging of skin tissue will be presented. This includes the fabricated device design, selective area intermixing, optimising the quantum dot epitaxy, and the use of hybrid quantum well/quantum dot structures.

- COFFEE BREAK -

TuR3-15 Invited **17:30-18:00**

PHOTONIC CRYSTAL VCSELS AND COHERENT ARRAYS

K.D. Choquette; Univ.of Illinois; United States

The past 30 years of VCSEL development has enabled high performance/low cost lasers for communication and sensing applications. Future applications will demand even better performance and new functionality. We will report on our recent efforts to develop high speed single mode photonic crystal VCSELs, as well as coherently coupled anti-guided 2-dimensional VCSEL arrays.

TuR3-16 **18:00-18:15**

LASING IN ø6-μm QUANTUM DOT MICRORING AT 107°C

N.V.Kryzhanovskaya[1], M.V.Maximov[2,1], A.M.Nadtochiy[1], I.A.Slovinskiy[2,1], M.M.Kulagina[2], Yu.M.Zadiranov[2], S.I.Troshkov[2], A.V.Savel'ev[1], E.M.Arakcheeva[1], A.E.Zhukov[1,2], D.Livshits3; 1-St. Petersburg Academic Univ., 2-Ioffe Physical Technical Inst., Russia, 3- Innolume GmbH, Germany; Russia

Ground-state lasing ($\lambda > 1.3$ μm) is demonstrated well above root temperature (up to 380 K) in a microring laser (6-μm in diameter) with InAs/InGaAs quantum dots.

TuR3-17 **18:15-18:30**

2 W 1.2 μm FLIP-CHIP QUANTUM DOT SEMICONDUCTOR DISK LASER

A. Rantamäki, J. Rautiainen, L. Toikkanen, I. Krestnikov[1], M. Butkus[2], E. Rafailov2, and O. Okhotnikov; Tampere Univ. Technol., Finland; 1-Innolume GmbH, Germany; 2-Univ. Dundee, United Kingdom

We present a flip-chip quantum dot semiconductor disk laser operating at 1200 nm with 2 W of output power. The low-loss flip chip geometry is shown to enable a relatively high output coupling ratio and undisturbed output spectrum. These features indicate that this design allows building a low-loss cavity which is particularly important for quantum dot semiconductor disk lasers.

TuR3-18 **18:30-18:45**

MODELLING OF SURFACE-PLASMON-POLARITON SUBWAVELENGTH MICRODISK LASERS

A.V. Naumenko, N.A. Loiko, V.V. Kabanov; Stepanov Inst. of Physics NAS Belarus; Belarus

Surface-plasmon-polariton guided modes of metal-caped microdisk lasers are analyzed. Their quality Q-factor, frequencies, spatio-temporal profiles, threshold gains of the active layer and confinement factor are determined by numerical simulations of full vectorial Maxwell equations as well as by analytical approaches. Dependencies of these characteristics are found versus azimuthal (radial) mode index, plasmon frequency (material absorption) and cavity geometrical sizes.

TuR3-19 **18:45-19:00**

DYNAMICAL MODEL OF POLARIZATION-CONTROLLED VERTICAL CAVITY SURFACE EMITTING LASER

S.E. Grigas, A.G. Rzhanov; Lomonosov Moscow State Univ.; Russia

Analysis of VCSEL polarization control is performed using numerical solution of rate equations describing the dynamics of photon concentration and inversion population. It is shown that by using of structures with polarization-dependent reflectivity stable single polarization mode can be achieved.

TuR3-20 Invited **19:00-19:30**

HIGH POWER QUANTUM DOT SEMICONDUCTOR DISK LASER

O.G. Okhotnikov; Tampere Univ. of Technology; Finland

The recent achievements of 1180 nm - 1260 nm Stranski-Krastanov quantum dot semiconductor disk lasers operating either at the ground or the excited state were overviewed. Frequency doubling using multiple-gain laser geometry was demonstrated to be practical solution for quantum dot based gain media. Intracavity heat spreader and thinned flip-chip structures are studied and compared.