Advance Program

Wednesday, 13 September 2006

All Sessions to be held in Richelieu

09.00 - 10.00

Session PLE: PLENARY SESSION
Session Chairs: Siegfried Janz, *National Research Council, Ottawa, ON, Canada*
Jung Hoon Shin, *Korea Advanced Institute of Science and Technology, Daejon, Korea*

09.00 - 09.15 **Welcoming Remarks**

PLE1 09.15 - 10.00

Silicon Integrated Nanophotonics - Advances and Challenges, Y. A. Vlasov, E. Dulkeith, F. Xia, M. O'Boyle, H. Hamann, L. Sekaric, S. Assefa and S. J. McNab, *IBM Research, Yorktown Heights, NY, USA*

Recent results on SOI nanophotonic circuits based on photonic wires and photonic crystals are reviewed. Strong light confinement at the diffraction limit enables dramatic scaling of the device area and allow unprecedented control over optical signals.

10.00 – 10.30 **COFFEE BREAK**

10.30 - 12.15

Session WA: OPTICAL SENSORS
Session Chair: Dan-Xia Xu, *National Research Council, Ottawa, ON, Canada*

WA1 10.30 - 11.00 (Invited)

Silicon-based Optical Biosensors, P. M. Fauchet, *University of Rochester, Rochester, NY, USA*

ABSTRACT NOT AVAILABLE

WA2 11.00 - 11.15

Evanescent Field Sensor using Silicon-on-Insulator Photonic Wires, A. Densmore, D.-X. Xu, P. Waldron, S. Janz, J. Lapointe, P. Cheben, A. Delage, B. Lamontagne, J. H. Schmid and E. Post, *National Research Council, Ottawa, ON, Canada*

A silicon-on-insulator based evanescent field sensor using silicon photonic wire waveguides is reported. The unique properties of high index contrast, submicron structures are exploited to enhance electric field magnitude and localization near the sensor surface. The evanescent field sensor is demonstrated in a Mach Zehnder configuration.

WA3 11.15 - 11.30

In-Plane Photonic Transduction of SOI Microcantilever Sensors, G. P. Nordin, S. Kim, Y. Qian, J. W. Noh, *Brigham Young University, Provo, UT, USA* and J. Jiang, *University of Alabama in Huntsville, Huntsville, AL, USA*

We are developing an in-plane photonic transduction technique using Si ridge waveguides for high sensitivity readout of SOI-based microcantilever sensor arrays. Required Si waveguide components include compact bends and splitters, and differential splitter structures.

WA4 11.30 - 11.45

Surface Plasmon Interferometer in Silicon-on-Insulator: Novel Concept for an Integrated Biosensor, P. Debackere, S. Scheerlinck, P. Bienstman and R. Baets, *Ghent University, Gent, Belgium*

We propose a novel configuration for a highly integrated and sensitive biosensor based on interference of two surface plasmon modes. Refractive index changes of 0.000001 RIU are detectable for a component of length 10 micrometers.

WA5 11.45 - 12.00

Label-Free Optical Biosensor using Silicon Two- Dimensional Photonic Crystal, M. Lee and P. M. Fauchet, *University of Rochester, Rochester, NY, USA*

We report the design, fabrication and testing of a label-free optical biosensor consisting of a two-dimensional photonic crystal microcavity. The sensitivity of this device is better than 50 pg/mm^2, with an extremely small internal surface of < 100μm^2.

WA6 12.00 - 12.15

Porous Silicon Waveguides for DNA Detection, G. Rong, *Vanderbilt University, Nashville, TN, USA*, A. Najmaie, J. E. Sipe, *University of Toronto, Toronto, ON, Canada* and S. M. Weiss, *Vanderbilt University, Nashville, TN, USA*

A porous silicon resonant waveguide sensor has been demonstrated for high sensitivity detection of biomolecules. Simulations predict a 60-fold enhancement over conventional SPR technology and initial experimental results using DNA oligos have been performed.

12.15 – 13.45 **LUNCH BREAK**

13.45 - 16.00

Session WB: **MICRORESONATORS**
Session Chair: Mario Paniccia, *Intel Corporation, Santa Clara, CA, USA*

WB1 13.45 - 14.15 (Invited)

Active Microring Resonator Devices in Silicon-on-Insulator, R. Soref*, US Air Force Research Laboratory, Hanscom AFB, MA, USA*

Recent results from several laboratories are surveyed. The topics include SOI-based ultrafast electrooptic modulators, N x N routing switches, tunable filters-and-add/drops, Raman lasers and amplifiers, electrically pumped Group IV lasers, optically pumped Er:SiO_2-clad slotted-ring emitters, and a variety of nonlinear optical devices.

14.15 - 14.30 **Special Presentation**

WB2 14.30 - 14.45

Spiral-Shaped Microdisk Resonator-based Channel Drop Filters on a Silicon Nitride Chip, J. Y. Lee and A. W. Poon*, Hong Kong University of Science and Technology, Kowloon, Hong Kong*

We demonstrate spiral-shaped microdisk resonator-based channel drop filters on a silicon nitride chip. Our experiments reveal multiple resonance modes that are sensitive to the laterally coupled waveguide angular positions along the non-rotational symmetric microresonator circumference.

WB3 14.45 - 15.00

High-Q Whispering Gallery Modes in Wet Etched Silica Microdisk Resonators Containing Silicon Nanocrystals, R. D. Kekatpure and M. L. Brongersma*, Stanford University, Stanford, CA, USA*

We demonstrate efficient coupling of Si-nanocrystal photoluminescence to whispering gallery modes of micron-sized wet-etched silica microdisks. Quality factors of >3500 are measured in the visible-near IR around 800nm wavelength. This has potential implications for increasing the efficiency of stimulated emission over the nonradiative Auger processes and a Si based laser.

WB4 15.00 - 15.15

Small Optical Filters in Silicon-on-Insulator, B. D. Timotijevic*, G. T. Reed, University of Surrey, Guildford, Surrey, UK*, R. Jones, A. Michaeli, A. Liu*, Intel Corporation, Santa Clara, CA, USA* and G. Z. Mashanovich*, University of Surrey, Guildford, Surrey, UK*

Single mode, polarisation independent filters with large free spectral range are basic requirements for optical networks. In this paper we discuss (with experimental results) the possibility of establishing such devices upon small strip waveguides in silicon-on-insulator (SOI).

WB5 15.15 - 15.30

SOI Photonic Wire Waveguide Ring Resonators using MMI Couplers, D.-X. Xu*, National Research Council, Ottawa, ON, Canada*

We demonstrate a novel SOI photonic wire ring resonator that uses a MMI coupler which has a compact size of 3×9 μm^2. The resonators exhibited quality factor of 5,000, and resonance depth of 20 dB.

WB6 15.30 - 16.00 (Invited)

Modulating, Delaying, Stopping and Converting Light on a Silicon Chip, M. Lipson*, Cornell University, Ithaca, NY, USA*

We demonstrate the ability to control the flow of light on-chip including stopping of light, wavelength conversion and high frequency modulation. The structures consist of high confinement silicon resonators.

16.00 – 16.30 **COFFEE BREAK**

16.30 - 18.30

Session WC: **MODULATION**
Session Chair: Michal Lipson, *Cornell University, Ithaca, NY, USA*

WC1 16.30 - 17.00 (Invited)

SiGe and Si Optical Modulators, D. Marris-Morini*,* E. Cassan, L. Vivien, S. Maine, D. Pascal, S. Laval*, Institut d'Electronique Fondamentale, Orsay, France*, and J.-M. Fedeli, *CEA-LETI, Grenoble, France*

Modulation-doped SiGe-Si Multiple Quantum Well and all-Silicon modulators embedded in reverse biased PIN junctions and integrated in SOI waveguides are described. Experimental evidence for electrorefractive effect is presented, and frequency operation is investigated.

WC2 17.00 - 17.15

Large Electro-Optic Effect in Tensile Strained Ge-on-Si Films, S. Jongthammanurak, J. Liu*, Massachusetts Institute of Technology, Cambridge, MA, USA*, K. Wada*, University of Tokyo, Bunkyo, Tokyo, Japan*, D. D. Cannon, D. T. Danielson, D. Pan, J. Michel and L. C. Kimerling*, Massachusetts Institute of Technology, Cambridge, MA, USA*

We report the observation of an enhanced electro-optic effect in the weakly absorbing regime for tensile strained Ge epitaxial films. With $\Delta n/F$ = 280 pm/V and $\Delta\alpha/\alpha$~3, the material has significant potential for field-induced phase or electro-absorption modulator devices.

WC3 17.15 - 17.45 (Invited)

A Linear Electrooptic Effect in Silicon, Induced by Use of Strain, J. Fage-Pedersen, L. H. Frandsen, A. V. Lavrinenko, and P. I. Borel, *Technical University of Denmark, Kgs. Lyngby, Denmark*

The crystal structure in a silicon waveguide can be distorted by application of strain. Thereby, the otherwise forbidden linear electrooptic (Pockels) effect is induced, opening a new route for optical modulation in silicon.

WC4 17.45 - 18.00

Compact Electro-Optic Modulator on Silicon-on-Insulator Substrates using Cavities with Ultra-Small Modal Volumes, B. Schmidt, Q. Xu, J. Shakya and M. Lipson, *Cornell University, Ithaca, NY, USA*

We experimentally demonstrate an electro-optic modulator using a high-index-contrast silicon Fabry-Perot resonator. This compact high-speed device is a 1-D integrated cavity, only 4.5λ/n in length with an embedded p-i-n junction on a silicon-on-insulator platform.

WC5 18.00 - 18.30 (Invited)

Silicon Photonic Crystal Waveguide Modulators, L. Gu, *University of Texas at Austin, Austin, TX, USA*, W. Jiang, *Omega Optics Inc., Austin, TX, USA*, X. Chen and R. T. Chen, *University of Texas at Austin, Austin, TX, USA*

Ultra-compact silicon-photonic-crystal-waveguide-based thermo-optic and electro-optical Mach-Zehnder interferometers have been proposed and fabricated. Thermal and electrical simulations have been performed. Experimental results were in a good agreement with the theoretical prediction.

Panorama

18.30 - 20.30

Session P: POSTER SESSION & WELCOME RECEPTION

P1 The Impact of the Rare-earth Precursor on the Composition, Structure and Luminescence of Er-doped Silicon-rich Silicon Oxide Films, J. Wojcik, *McMaster University, Hamilton, ON, Canada*

Silicon-rich silicon oxide films have been doped using an organometallic erbium precursor. Carbon contamination in the films is shown to have a pronounced effect on the visible photoluminescence. The doping also impacts formation of nanocrystals within the films.

P2 Erbium-Doped Silicon-Rich Oxide Waveguides, T. J. Clement, R. G. DeCorby, N. Ponnampalam, T. Allen, A. Hryciw and A. Meldrum, *University of Alberta, Edmonton, AB, Canada*

We have fabricated and characterized strip waveguides based on an erbium-doped silicon-rich oxide (~SiO) core layer. Efficient non-resonant excitation of the erbium was observed under transverse pumping. However, carrier-induced losses greatly exceed erbium-related gain.

P3 Non-Linear Optical Properties of Si Nanocrystals, M. Cazzanelli, R. Spano, N. Daldosso, Z. Gaburro, *University of Trento, Povo, Italy*, S. Hernandez, Y. Lebour, P. Pellegrino, B. Garrido, *University of Barcelona, Barcelona, Spain*, E. Jordana, J.-M. Fedeli, *CEA-LETI, Grenoble, France* and L. Pavesi, *University of Trento, Povo, Italy*

Nonlinear optical refraction and absorption have been measured on Si nanocrystals grown by plasma-enhanced-chemical-vapour-deposition. Strong nonlinearities were found at 830 nm and at 1552 nm. Different behaviours, depending on the pump-pulse duration, have been observed.

P4 CWDM Transmitter Board based on SOI, J. Bruns, T. Mitze, M. Schnarrenberger, L. Zimmermann, *Technical University Berlin, Berlin, Germany*, M. Krieg, *Merge Optics GmbH, Berlin, Germany*, J. Kreissl, *Heinrich-Hertz-Institute, Berlin, Germany*, J. Janiak, T. Hartwich, *Heinrich-Hertz-Institut für Nachrichtentencnik, Berlin, Germany* and K. Petermann, *Technical University Berlin, Berlin, Germany*

A CWDM transmitter board based on SOI is demonstrated. Active III/V components are integrated using Au/Sn solder technology and passive alignment. Precise mounting of lasers on the board is necessary to ensure low coupling losses.

P5 Polarization State of Silicon Raman Lasers Dictated by Non-Degenerate Two-Photon Absorption, O. Boyraz and E.-K. Tien, *University of California - Irvine, Irvine, CA, USA*

We show that the non-degenerate TPA process does not allow lasing in silicon waveguides while the pump and the Stokes having the collinear polarization states. Lasing threshold varies almost 2dB for other polarization states.

P6 Efficient Raman Amplification in Cladding-Pumped Silicon Waveguides, M. Krause, H. Renner, E. Brinkmeyer, *Technische Universität Hamburg-Harburg, Hamburg, Germany*, S. Fathpour, D. Dimitropoulos, V. Raghunathan and B. Jalali, *University of California - Los Angeles, Los Angeles, CA, USA*

The maximum achievable total gain of silicon Raman amplifiers can be significantly increased by injecting the pump power into a surrounding cladding instead of directly into the silicon core.

P7 Interlaced Coupled-Cavity Waveguide in Photonic Crystal for Low Group Velocity and High Bit-Rate Applications, A. R. Shroff and P. M. Fauchet, *University of Rochester, Rochester, NY, USA*

Slow-light devices are important for commercial implementation of active integrated silicon photonics. Design of an interlaced coupled-cavity photonic crystal waveguide with maximum usable bandwidth above 400 Gbits/s and group velocity below 0.004c is reported.

P8 Upconversion Emission from ErSiO Superlattice Crystal Waveguide, H. Isshiki, T. Ushiyama and T. Kimura, *University of Electro-Communications, Chofu, Tokyo, Japan*

ErSiO superlattice crystal waveguide is demonstrated. Due to the optical confinement effect, upconversion emission can be observed. From the upconversion, the light propagation properties in the waveguide are discussed.

P9 Fabrication and Characterization of Two-Dimensional Photonic Crystal on Silicon by Efficient Methods, X. Xu, *Chinese Academy of Sciences, Beijing, China*, C. Wang, *Wuhan University of Technology, Wuhan, China*, F. Li, *Chinese Academy of Sciences, Beijing, China*, G. Xiong, *Wuhan University of Technology, Wuhan, China*, Y. Liu and H. Chen, *Chinese Academy of Sciences, Beijing, China*

Two-dimensional photonic crystals working in near infrared region are fabricated into silicon-on-insulator wafer by 248-nm deep UV lithography. We present an efficient way to measure the photonic crystal waveguide's light transmission spectra at given polarization states.

P10 Vertically-Stacked SOI Waveguides for 3-D Photonic Circuits, C. Brooks, J. K. Doylend, A. P. Knights and P. E. Jessop, *McMaster University, Hamilton, ON, Canada*

We present a fabrication process for vertically-stacked SOI waveguides using spin-on-glass bonding to process individual layers. Simulations have shown that complete power transfer between 5 μm thick waveguides requires a 1.4 mm coupling length.

P11 Composition and Strain of Coherent $Si_{1-x}Ge_x$ Islands on Si (100), D. J. Lockwood, X. Wu and J.-M. Baribeau, *National Research Council, Ottawa, ON, Canada*

For $Si_{1-x}Ge_x$ dots important questions concern their chemical and strain profiles. Here we study such details in coherent $Si_{1-x}Ge_x$ islands grown by molecular beam epitaxy for a fixed growth temperature but for different alloy concentrations.

P12 Introducing Carrier Localisation in Total Internal Reflection Optical Switches to Restrict Carrier Diffusion in the Guiding Layer, D. Thomson, G. T. Reed, F. Y. Gardes, G. Z. Mashanovich and S. Howe, *University of Surrey, Guildford, Surrey, UK*

Previous total internal reflection based switches have suffered from the diffusion of carriers in the guiding layer leading to inefficient reflection and carrier injection. In our proposed device this problem is overcome by using a SiO_2 barrier.

P13 All-Optical MZI XOR Logic Gate based on Si Slot Waveguides Filled by Si-nc Embedded in SiO_2, P. Sanchis, F. Cuesta-Soto, J. Blasco, J. Garcia, A. Martinez, J. Marti, *Universidad Politecnica Valencia, Valencia, Spain*, F. Riboli, and L. Pavesi, *University of Trento, Povo, Italy*

An all-optical XOR logic gate based on a Mach-Zehnder interferometer is proposed and analyzed. It is implemented with silicon slot waveguides filled with silicon nanocrystals embedded in silica, which show a high nonlinear Kerr effect.

P14 Transmission Characteristics of Silicon One-Dimensional Photonic Crystals Embedded with Polymer, K. Hosomi, *University of Tokyo, Meguro, Tokyo, Japan*, M. Tokushima, *NEC Corporation, Tsukuba, Ibaraki, Japan*, H. Yamada, S. Goto, T. Katsuyama, *University of Tokyo, Meguro, Japan*, H. Yamada, *NEC Corporation, Tsukuba, Ibaraki, Japan* and Y. Arakawa, *University of Tokyo, Meguro, Tokyo, Japan*

We produced a 1D PC microcavity made of silicon and polymer to demonstrate the functionality of an optical tunable filter. We observed a shift in the resonant peak due to the TO effect.

P15 An Integrated Optical Receiver in MS/RF CMOS Process, H. Liu, X. Xu, *Chinese Academy of Sciences, Beijing, China*, L. Mao, *Tianjin University, Tianjin, China*, P. Gao and H. Chen, *Chinese Academy of Sciences, Beijing, China*

A monolithically integrated optoelectronic receiver was realized utilizing a deep sub-micron MS/RF CMOS process. Novel photo-diode with STI (Shallow Trench Isolation) and high-speed receiver circuit were designed. This OEIC takes advantage of several new features to improve the performance.

P16 Turning-Mirror-Integrated Arrayed-Waveguide Gratings on Silicon-on-Insulator, W. Zheng, K. Jia, S. Xiao, F. Wang, G. Li, Y. Li, X. Jiang, M. Wang and J. Yang, *Zhejiang University, Hangzhou, Zhejiang, China*

Optical demultiplexers employing the turning-mirror-integrated arrayed-waveguide grating are demonstrated on silicon-on-insulator. Description of the design and fabrication procedures is provided. The sizes of the devices are effectively reduced while the performance are comparable with that of the conventinal one that was farbicated on the same wafer.

P17 Fabrication of High Quality AlGaSb/AlSb-distributed Bragg Reflectors on Si(001) Substrates, K. Akahane, N. Yamamoto, S.-I. Gozu, A. Ueta and M. Tsuchiya, *National Institute of Information & Communications Technology, Koganei, Tokyo, Japan*

We fabricated AlGaSb/AlSb-distributed Bragg reflectors (DBRs) on Si(001) substrates. A stop band of 100 nm centered at 1500 nm was observed using a Fourier transform infrared spectrometer.

P18 Temperature-Dependent Carrier Recombination Processes in Nanocrystalline Si/SiO_2 Multi-Layers Studied by Time-Resolved and Time-Integrated Photoluminescence, S.-H. Choi, S. Kim, Y. M. Park, *Kyung Hee University, Yongin, Korea* and K. J. Kim, *Korea Research Institute of Standards and Science, Taejon, Korea*

Ion beam sputtering was used to fabricate 50-period SiO_2/SiO_x multilayers, which were subsequently annealed to form Si nanocrystals in SiO_x layers. Sequential temperature-dependent correlation between the integrated PL intensity and the lifetime was observed at each x value, and explained with reference to a two-level (singlet/triplet) quantum cofinment model.

P19 A New Design of Wavelength Division Multiplexing Filter, Y. Kobayashi and K. Wada, *University of Tokyo, Tokyo, Japan*

We propose a new wavelength division multiplexing filter, in which we replaced the slab structure of the arrayed waveguide gratings (AWGs) with directional couplers. 2D-FDTD simulation verifies the demultiplexing function in the wavelength of 1400nm~1600nm.

P20 Focused-Ion-Beam Fabricated Vertical Fiber Couplers on Silicon-on-Insulator Waveguides, J. Schrauwen, D. J. Van Thourhout and R. Baets, *Ghent University, Gent, Belgium*

We fabricated grating couplers in silicon-on-insulator waveguides with focused-ion-beam. First devices were very lossy, but by using selective etchant and a hard mask we obtained efficiencies comparable to traditional fabrication techniques.

P21 Ultrafast Pulse Propagation in Zero-Dispersion Silicon Wire based OTDM System, X. Chen, N. C. Panoiu, I. Hsieh, J. I. Dadap and R. M. Osgood, *Columbia University, New York, NY, USA*

We present the first theoretical study of femtosecond pulse train propagation in silicon wire based intra-chip OTDM transmission line. Dispersion engineering is employed to achieve GVD-free transmission.

P22 SiO_x/Si Interfacial Si Nano-Pyramids Enhancd Electroluminescence from Si-Rich SiO_x MOSLED, G.-R. Lin*, National Taiwan University, Taipei, Taiwan, R.O.C.* and C.-K. Lin*, National Chiao Tung University, Hsinchu, Taiwan, R.O.C.*

Interfacial (100)-oriented Si nanopyramids are synthesized with surface density of $109cm^{-2}$ prior to the growth of Si-rich SiO_x, which greatly suppresses blue-green EL and improve near-infrared EL at 30 nW with lifetime of >10 hrs.

P23 Sub-ns Dynamics of nc-Si QDs in SiN_x Matrix Grown by PECVD, J.-H. Shin, K.S. Cho, C. Huh, K.-H. Kim, J. Hong, G. Y. Sung*, Electronics & Telecommunications Research Institute, Daejeon, Korea*, Y.D. Chang, D.H. Lee, *Chungnam National University, Daejeon, Korea*, and Y.J. Cho, *Korea Research Institute of Standards and Science*

Time-resolved PL characteristic of the nc-Si QDs in SiN_x matrix grown by PECVD is studied. The measured PL lifetime of nc-Si QDs is about 0.43 ns.

P24 Corrugated SOI Waveguide for Optimal Slow-Light Elements, J. Garcia, P. Sanchis, A. Martinez, F. Cuesta-Soto, J. Blasco, A. Griol, and J. Marti*, Universidad Politecnica Valencia, Valencia, Spain*

We present the design and fabrication of a 1D periodic structure based on a conventional SOI waveguide with transversal corrugations. This structure is proposed as an optimal slow-light element working around 1550 nm.

P25 An Active Demodulation Pixel using a Current Assisted Photonic Demodulator Implemented in 0.6µm Standard CMOS, W. van der Tempel, D. Van Nieuwenhove and R. Grootjans*, Vrije University Brussels, Brussels, Belgium*

With the ever increasing automation of industrial processes, and the growing need for intelligent systems, the demand for artificial 3D vision increases. Systems based on Time-of-Flight provide an elegant solution to these needs. The key to enable wide scale use of TOF ranging systems is a novel photonic demodulator.

P26 SOI Optical Switch Matrix Integrated with Spot Size Converter (SSC) and Total Internal Reflection (TIR) Mirrors, J. Yu*, Chinese Academy of Sciences, Beijing, China*

Integration of SOI optical switch matrix with isolating grooves, total internal reflection (TIR) mirrors and spot size converter (SSC) was studied. 16x16 matrix with TIR mirrors and SSC were fabricated on SOI wafer. The rise and fall times of the devices are 2.1 µs and 2.3 µs, respectively.

P27 Low-Capacitance Integrated Silicon Finger Photodetector, W. Gaberl and H. Zimmermann*, Vienna University of Technology, Vienna, Austria*

By structuring an integrated PIN photodiode in 0.6µm BiCMOS technology with the help of fingers its capacitance is reduced to one third whereby its bandwidth is only reduced by a factor of less than 1.2.

P28 Monolithically-Integrated SOI-based Planar Lightwave Filter for Passive Optical Network Applications, S. Bidnyk, A. Balakrishnan, M. Pearson, M. Gao*, Enablence Inc., Ottawa, ON, Canada*, D. Feng, H. Liang, W. Qian, C.-C. Kung, J. Fong, J. Yin and M. Asghari*, Kotura, Monterey Park, CA, USA*

A monolithically-integrated design and fabrication of a silicon-on-insulator filter is described. The filter uses a combination of a cascaded Mach-Zehnder structure and a planar reflective grating to multiplex 1310 nm channel and demultiplex 1490 and 1550 nm channels for applications in passive optical networks.

P29 Near-infrared Electroluminescence from Multilayered CdF_2/CaF_2 Quantum Heterostructure Grown on Trench-Patterned Si(111) Substrate, K. Jinen, K. Uchida, S. Kodaira, M. Watanabe*,* and M. Asada*, Tokyo Institute of Technology, Meguro, Tokyo, Japan*

A CdF_2/CaF_2 intersubband transition light-emitting structure is fabricated on a trench-patterned Si substrate. Electroluminescence from the device was observed in the near-infrared region.

P30 Asymmetric GRIN Lensed Single Mode Fiber-to-Waveguide Coupler, J. Michel*, Massachusetts Institute of Technology, Cambridge, MA, USA*

0.6 dB coupling loss was observed for a lensed, asymmetric graded-index mode converter. The mode converter is used to couple light at 1550 nm from a single mode optical fiber to an on-chip waveguide with n = 1.7.

P31 Multispectral 1-D Photonic Crystal Photodetector, X. Sun*, Massachusetts Institute of Technology, Cambridge, MA, USA*

We demonstrate a novel photoconductor pixel, by using a photonic crystal structure incorporating photoconductive layers, which exploits resonant cavity enhancement to provide us with multispectral capability, high quantum efficiency, and dramatically suppressed shot noise.

P32 Light Emitting Silicon Nanowires for Photonic Device Applications, A. R. Guichard, M. L. Brongersma*, Stanford University, Stanford, CA, USA*, T. I. Kamins and S. Sharma*, Hewlett Packard Company, Palo Alto, CA, USA*

Si nanowires grown from $TiSi_2$ catalysts exhibit near-infrared photo-luminescence (PL) from quantum-confined excitons in the Si. Temperature dependent studies highlight the differences between Si nanocrystals and nanowires, which allow for exciton diffusion.

P33 A Characterization of Injection, Transport an Excitation Mechanisms in Si-nc based MOS-LEDs, C. Kompocholis, G. Pucker, P. Bellutti, A. Lui, L. Vanzetti, M. Bersani, M. Anderle*, ITC - IRST, Trento, Italy*, S. Prezioso, Z. Gaburro, Pavesi*, University of Trento, Povo, Italy*

We study the effect on a LED of a controlled insertion of N in Si oxide containing Si nanocrystals. Nitrogen lowers the electronic potential barrier, thus increasing the carrier injection. Electroluminescence spectroscopy suggests that both electron and hole injection can be observed.

P34 Subwavelength Waveguide Grating Coupler, P. Cheben, D.-X. Xu, S. Janz and A. Densmore*, National Research Council, Ottawa, ON, Canada*

We propose a new method for waveguide mode transformation and coupling between an optical fiber and a sub-micrometer waveguide. The method is based on mode effective index modification by a subwavelength grating and it is demonstrated by FDTD simulations of coupling between an SMF-28 fiber and a thin SOI waveguide.

P35 Out-of-Plane Total Internal Reflection Coupling Mirrors in Silicon-on-Insulator Ridge Waveguides, S. Janz, *National Research Council, Ottawa, ON, Canada*

We describe the fabrication and performance of out-of-plane coupling mirrors in SOI ridge waveguides. The mirrors consisted of a 45º facet formed using directional CAIBE etching through a lithographically defined window.

P36 Nonlinear Absorption in Silicon at Mid Infrared Wavelengths, V. Raghunathan, R. K. Shori, O. M. Stafsudd and B. Jalali, *University of California - Los Angeles, Los Angeles, CA, USA*

We report measurements of nonlinear absorption in mid-IR wavelengths. The absence of nonlinear losses beyond the two-photon bandedge combined with high Raman gain, thermal conductivity and damage threshold renders silicon an excellent mid-IR Raman crystal.

P37 Broadband Optical Amplification and Wavelength Conversion by Four-Wave Mixing in Silicon Waveguides, J. Zhang, *University of Rochester, Rochester, NY, USA*

We show that ultrabroadband parametric generation and wavelength conversion can be realized in silicon waveguides in the wavelength region near 1550~nm by tailoring their zero-dispersion wavelength and launching the pump wave close to this wavelength.

P38 Numerical Studies of Dispersion Properties of SOI Photonic Nanowires, X. Chen, L. Cao, N. C. Panoiu, R. M. Osgood, *Columbia University, New York, NY, USA* and R. Scarmozzino, *RSoft Design Group, Inc., Ossining, NY, USA*

We present a numerical study of dispersion properties of silicon-on-insulator photonic nanowires. We demonstrate that the effective index, group index, and second-order dispersion coefficient are determined by the waveguide geometry and can be strongly engineered.

P39 Photoluminescence Mechanism of Si Nanocrystals Embedded in SiO_2 Matrix, X. Wang, *Chinese Academy of Sciences, Beijing, China*

The interface state recombination effect from the quantum confinement effect in PL signals from the SRO material system was studied. The results show that the larger the size of Si NCs, the more beneficial for the interface state recombination process to surpass the quantum confinement process.

P40 Integrated Silicon Waveguide-based Structures for Terminal Detection of 1550nm, J. K. Doylend, P. J. Foster, J. D. B. Bradley, P. E. Jessop and A. P. Knights, *McMaster University, Hamilton, ON, Canada*

We describe the fabrication of defect engineered waveguide detectors, and demonstrate that with optimal thermal treatment, detector dark current may be minimized to be a small fraction of the signal, even at a reverse bias of 5V. A design for a terminal detector (as opposed to a signal monitor) is proposed which consists of a waveguide ring. Preliminary simulations suggest a significant increase in responsivity compared to straight waveguide detectors.

P41 Low-Power, High-Speed Mach-Zehnder Modulator in Silicon, S. J. Spector, T. M. Lyszczarz, M. W. Greis, D. M. Lennon, J. U. Yoon, M. E. Grein, R. T. Schulein, *MIT Lincoln Laboratory, Lexington, MA, USA*, F. Gan and F. X. Kaertner, *Massachusetts Institute of Technology, Cambridge, MA, USA*

A high speed diode-based optical modulator has been fabricated in silicon. This device achieves an extremely low VπL of 0.02 V-cm from 10-100 MHz. Modulation depths of 30% have been achieved at an input power of 100 mW at 5 GHz.

P42 Triggered Electroluminescence from a Strained $Si_{1-X}Ge_X$/Si Single Quantum Well, N. Yasuhara and S. Fukatsu, *University of Tokyo, Tokyo, Japan*

Triggered electroluminescence is demonstrated in an electrically biased strained $Si_{1-X}Ge_X$/Si single quantum well where otherwise spatially separated electron-hole pairs created through impact ionization are made to recombine upon removing the bias voltage, paving a way towards on-demand Si-based single photon emitters and optical memory application.

Thursday, 14 September 2006

08.30 - 10.30

Session ThA: PHOTODETECTORS
Session Chair: Andrew P. Knights, *McMaster University, Hamilton, ON, Canada*

ThA1 08.30 - 09.00 (Invited)

850 nm Germanium Photodetector Performance, M. Morse, O. Dosunmu, *Intel Corporation, Santa Clara, CA, USA*, E. Ginsburg, Y. Chetrit, and G. Sarid, *Intel Corporation, Jerusalem, Israel*

We have fabricated photodetectors with comparable responsivity at 850 nm as commercial detectors, and a dark current low enough to achieve similar sensitivities in receivers. Further improvements in reliability and bandwidth will also be reported.

ThA2 09.00 - 09.15

Waveguide-Integrated Ge p-i-n Photodetectors on SOI Platform, J. Liu, *Massachusetts Institute of Technology, Cambridge, MA, USA*

We demonstrate a fully CMOS processed Ge p-i-n photodetector integrated with a Si waveguide on a SOI platform with a high responsivity of 1.0 A/W at λ=1520nm, and a 3 dB bandwidth of >4.5 GHz measured at λ=1550 nm.

ThA3 09.15 - 09.45 (Invited)

Silicon Nano-Photodiodes, K. Ohashi, J. Fujikata, T. Ishi, K. Nishi, *NEC Corporation, Tsukuba, Ibaraki, Japan*, M. Mizuno, K. Nose, *NEC Corporation, Sagamihara, Kanagawa, Japan*, K. Ishihara, and T. Baba, *NEC Corporation, Tsukuba, Ibaraki, Japan*

A high-speed Si nano-photodiode with a surface plasmon antenna has been developed. The optical near-field technology used in this device would increase the feasibility of realizing on-chip optical data transmission and optical clock distribution in LSIs.

ThA4 09.45 - 10.00

Temperature-Dependent Analysis of Ge-on-SOI Photodetectors and Receivers, S. J. Koester, L. Schares, C. M. Schow, G. K. Dehlinger and R. A. John, *IBM Research, Yorktown Heights, NY, USA*

The temperature dependence of dark current and receiver performance for Ge-on-SOI photodiodes is presented. Error-free receiver operation at 10 Gb/s is achieved at 85°C despite a 10x increase in dark current compared to room temperature.

ThA5 10.00 - 10.30 (Invited)

Silicon-based Resonant-Cavity-Enhanced Photodetectors, B. Cheng, C. Li, R. Mao, F. Yao, C. Xue, J. Zhang, W. Shi, Y. Zuo, J. Yu and Q. Wang, *Chinese Academy of Sciences, Beijing, China*

Silicon-based resonant-cavity-enhanced photodetectors (RCE-PD) with Si, Ge islands and InGaAs as absorption materials were introduced, respectively. The Ge islands and Si RCE-PD had a membrane structure and the Si-based InGaAs RCE-PDs were fabricated by bonding technology.

10.30 – 11.00 COFFEE BREAK

11.00 - 12.30

Session ThB: Hybrid Integration
Session Chair: Roel Baets, *Ghent University, Gent, Belgium*

ThB1 11.00 - 11.30 (Invited)

Silicon Evanescent Lasers and Amplifiers, J. E. Bowers, A. W. Fang, H. Park, *University of California - Santa Barbara, Santa Barbara, CA, USA*, R. Jones, *Intel Corporation, Santa Clara, CA, USA*, O. Cohen, *Intel Corporation, Jerusalem, Israel* and M. Paniccia, *Intel Corporation, Santa Clara, CA, USA*

The use of III-V based quantum wells bonded to silicon waveguides to form electrically pumped, hybrid silicon evanescent lasers and amplifiers on a silicon photonics platform is described.

ThB2 11.30 - 11.45

Heterogeneous Integration of III-V Photodetectors and Laser Diodes on Silicon-on-Insulator Waveguide Circuits, G. Roelkens, J. Brouckaert, S. Verstuyft, J. Schrauwen, D. J. Van Thourhout and R. Baets, *Ghent University, Gent, Belgium*

InP/InGaAsP photodetectors and lasers were integrated on top of ultra-compact Silicon-on-Insulator waveguide circuits using Benzocyclobutene adhesive bonding. Light is coupled between III-V device and SOI waveguide using an inverted taper.

ThB3 11.45 - 12.00

Concept for an Alternative Solder-Free Flip-Chip Technique on SOI using Black-Silicon, M. Schnarrenberger, L. Zimmermann, T. Mitze, K. Voigt, J. Bruns and K. Petermann, *Technical University Berlin, Berlin, Germany*

Black-silicon regions are defined on an SOI board and covered with an adhesion layer. The contacts of to be mounted devices are pushed towards these regions, to establish a mechanical, electrical, and thermal contact.

ThB4 12.00 - 12.30 (Invited)

VCSEL Integration for Silicon Photonics, F. Koyama, *Tokyo Institute of Technology, Yokohama, Kanagawa, Japan*

We review the recent progress of VCSEL photonics, which includes uncooled long wavelength VCSELs, wavelength engineering and new coupling scheme for Si wafer platforms. High density VCSEL array and chip-scale WDM integration will be discussed.

12.30 – 14.00 LUNCH BREAK

14.00 - 15.30

Session ThC: Optoelectronic Integration
Session Chair: Richard Soref, *US Air Force Research Laboratory, Hanscom AFB, MA, USA*

ThC1 14.00 - 14.30 (Invited)

Analog RF Performance of a CMOS Optical Filter, K.-Y. Tu, Y.-K. Chen, A. Leven, M. S. Rasras, D. M. Gill, S. S. Patel, A. E. White, *Lucent Technologies, Murray Hill, NJ, USA*, D. N. Carothers, A. T. Pomerene, M. J. Grove, *BAE Systems, Arlington, VA, USA*, D. K. Sparacin, J. Michel, M. A. Beals and L. C. Kimerling, *Massachusetts Institute of Technology, Cambridge, MA, USA*

We have used an integrated narrowband optical filter fabricated in a CMOS process to optically slice a modulated broadband RF signal into an individual channel of 1 GHz bandwidth. The detected channel signal has an in-band spur-free dynamic range (SFDR) of 88 dB•Hz2/3 and greater than 28dB rejection of out-of-band signal.

ThC2 14.30 - 15.00 (Invited)

Incorporation of a Photonic Layer at the Metallizations Levels of a CMOS Circuit, J.-M. Fedeli, M. Migette, L. Di Cioccio, L. El Melhaoui, *CEA-LETI, Grenoble, France*, R. Orobtchouk, *INSA/LPM, Villeurbanne, France*, C. Seassal, P. Rojo-Romeo, F. Mandorlo, *École Centrale de Lyon, Ecully, France*, D. Marris-Morini, and L. Vivien, *Institut d'Electronique Fondamentale, Orsay, France*

The integration of a photonic layer on a CMOS circuit can be done either by wafer bonding of an SOI photonic circuit or by low temperature fabrication of a photonic layer at the metallization levels.

ThC3 15.00 - 15.30 (Invited)

Silicon Electronic Photonic Integrated Circuits for High Speed Analog to Digital Conversion, F. X. Kaertner, R. Amataya, G. Barbastathis, H. Byun, F. Gan, C. W. Holzwarth, J. L. Hoyt, E. P. Ippen, O. O. Olubuyide, J. S. Orcutt, M. Park, M. Perrott, M. A. Popovic, P. T. Rackich, R. J. Ram, H. I. Smith, S. Takahashi, *Massachusetts Institute of Technology, Cambridge, MA, USA*, M. Geis, M. E. Grein, T. M. Lyszczarz, S. J. Spector and J. U. Yoon, *MIT Lincoln Laboratory, Lexington, MA, USA*

Integrated optical components on the silicon platform and optically enhanced electronic sampling circuits are demonstrated. These components enable the fabrication of various electronic-photonic A/D converter chips that surpass currently available technology in speed and resolution.

15.30 – 16.00 COFFEE BREAK

16.00 - 17.30
Session ThD: HETEROEPITAXY
Session Chair: John E. Bowers, *University of California - Santa Barbara, Santa Barbara, CA, USA*

ThD1 16.00 - 16.30 (Invited)

High Performance Quantum-Dot Lasers on Silicon - Challenges and Future Prospects, P. Bhattacharya, Z. Mi and J. Yang, *University of Michigan, Ann Arbor, MI, USA*

We report the growth and characteristics of high performance self-organized InGaAs/GaAs quantum dot lasers on silicon. The devices exhibit low threshold current (J_{th}~900 A/cm^2), high output power (~150 mW), and large characteristic temperature (T_0 =244 K).

ThD2 16.30 - 17.00 (Invited)

Visible Lasing on Si using Rare Earth Doped GaN, A. J. Steckl and J.-H. Park, *University of Cincinnati, Cincinnati, OH, USA*

We review lasing from rare earths in GaN grown on Si, leading to the first demonstration of visible lasing on Si. This can result in lasers on Si in the visible and near-IR range.

ThD3 17.00 - 17.30 (Invited)

Monolithic, Bufferless AlGaSb Emitters on Si based on Interfacial Misfit Arrays, D. L. Huffaker, *University of New Mexico, Albuquerque, NM, USA*

We present a monolithic, bufferless approach to III-V devices on Si based on self-assembled arrays of 90˚ interfacial misfits. This approach enables room-temperature photopumped VCSELs and in-plane lasers. Diodes are under development.

Friday, 15 September 2006

08.30 - 10.30
Session FA: LIGHT SOURCES
Session Chair: Lorenzo Pavesi, *University of Trento, Povo, Italy*

FA1 08.30 - 09.00 (Invited)

Directly Pumped Crystalline Silicon Laser - An Impossible Possibility? J. Xu, *Brown University, Providence, RI, USA*

Lasing at 1.28μm was observed in a crystalline silicon structure under direct optical pumping. The experimental findings of our group so far and a base model of the underlying mechanism are summarized in this presentation.

FA2 09.00 - 09.15

Bright Green Visible Electroluminescence from Rare Earth Doped Silicon Rich SiO_x, I. Calder, *Group IV Semiconductor, Kanata, ON, Canada*

Silicon rich silicon oxide was deposited by ECR-PECVD, doped with Er or Tb, and processed into device structures. Electrical measurements were used to characterize conduction mechanisms while spectroscopic electroluminescence provided information on brightness and mechanisms.

FA3 09.15 - 09.30

Enhancement of Fowler-Nordheim Tunneling Based Light Emission from metal-SiO_x-Si MOSLED, G.-R. Lin*, National Taiwan University, Taipei, Taiwan, R.O.C.* and C.-J. Lin*, National Chiao Tung University, Hsinchu, Taiwan, R.O.C.*

PECVD grown nanocrystallite Si structure at SiO_x/Si interface has been demonstrated to show its capability in enhancing the surface roughness and the Fowler-Nordheim tunneling based carrier injection for improved light emission from a metal-SiO_x-Si MOSLED.

FA4 09.30 - 09.45

Signal Enhancement Improvement at 1535 nm of Si-nc: Er^{3+} Waveguides, D. Navarro-Urrios, N. Daldosso*, University of Trento, Povo, Italy*, F. Goubilleau, R. Rizk*, Ecole Nationale Superieure d'Ingenieurs de Caen, Caen, France*, B. Garrido*, University of Barcelona, Barcelona, Spain* and L. Pavesi*, University of Trento, Povo, Italy*

Insertion losses, photoluminescence, lifetime and pump/probe measurements have been carried out on rib-loaded waveguides containing Er^{3+} ions coupled to Si nanoclusters (Si-nc). Evidences of partial inversion of the Er^{3+} ions excited via Si-nc are presented.

FA5 09.45 - 10.00

Dielectric Matrix Influence on the Photoluminescence Properties of Silicon Nanocrystals, L. Ferraioli, M. Cazzanelli, N. Daldosso*, University of Trento, Povo, Italy*, V. Mulloni, P. Bellutti*, ITC - IRST, Trento, Italy*, S. Yerci, R. Turan*, Middle East Technical University, Ankara, Turkey*, A. Mikhaylov, D. Tetelbaum*, Institute for Physics of Microstructures, Nizhny Novgorod, Russia* and L. Pavesi*, University of Trento, Povo, Italy*

Photoluminescence properties of silicon nanocrystals embedded in five different oxide matrices are analyzed. Samples are silicon rich oxide and oxynitride produced by PECVD and ion implantation and crystalline and amorphous aluminum oxide implanted with silicon.

FA6 10.00 - 10.30 (Invited)

Hybrid Glass-Silicon Microphotonics: Gain, Amplification, and Lasing Action in SOI Devices with Er:SiO_x Overcladding, O. J. Painter*, California Institute of Technology, Pasadena, CA, USA*

ABSTRACT NOT AVAILABLE

10.30 – 11.00 COFFEE BREAK

11.00 - 12.30

Session FB: NONLINEAR OPTICS
Session Chair: Bahram Jalali, *University of California - Los Angeles, Los Angeles, CA, USA*

FB1 11.00 - 11.30 (Invited)

Broad-Bandwidth Amplification and Wavelength Conversion on a Silicon Chip, M. A. Foster, J. E. Sharping, A. L. Gaeta, A. C. Turner, B. S. Schmidt, and M. Lipson, *Cornell University, Ithaca, NY, USA*

By careful design of the waveguide dimensions, we can achieve phase-matched four-wave mixing in Silicon resulting in amplification over a bandwidth of 29-nm and efficient wavelength conversion from 1511 to 1591 nm.

FB2 11.30 - 11.45

High Bandwidth Silicon Ring Resonator Raman Amplifier, Y.-H. Kuo, H. Rong and M. Paniccia*, Intel Corporation, Santa Clara, CA, USA*

We report a high bandwidth silicon Raman amplifier using a ring resonator that has high-Q for the pump laser to enhance the intra-cavity power and low-Q for the signal wavelength to ensure high speed amplification.

FB3 11.45 - 12.00

Energy Harvesting in Silicon Raman Amplifiers, K. M. Tsia, S. Fathpour and B. Jalali*, University of California - Los Angeles, Los Angeles, CA, USA*

A method to recover power lost to two photon absorption is described. Approach is applicable to both Raman and Kerr based devices. CW Raman amplification with negative electrical power dissipation is experimentally demonstrated in silicon.

FB4 12.00 - 12.15

Self-Phase Modulation of Femtosecond Pulses in Photonic Wire Waveguides, I. Hsieh, X. Chen, J. I. Dadap, N. C. Panoiu, R. M. Osgood*, Columbia University, New York, NY, USA*, S. J. McNab and Y. A. Vlasov*, IBM Research, Yorktown Heights, NY, USA*

We use femtosecond pulses propagating inside a submicron cross-section Si photonic-wire waveguide to demonstrate strong interaction between self-phase modulation and dispersion effects, and provide comparison to a full theoretical analysis.

FB5 12.15 - 12.30

All-Optical Wavelength Conversion using Silicon Photonic Wire Waveguide, K. Yamada*,* H. Fukuda*,* T. Watanabe*,* T. Tsuchizawa*,* H. Shinojima*,* T. Tanabe*, NTT Corporation, Atsugi, Kanagawa, Japan*, M. Takahashi*, NTT-AT Nanofabrication Co., Atsugi, Japan* and S.-I. Itabashi*, NTT Corporation, Atsugi, Kanagawa, Japan*

Two types of all-optical wavelength converters are demonstrated. One based on two-photon absorption gives a modulation depth of about 50%. Another one based on four-wave mixing gives an internal conversion efficiency of about -11 dB.

12.30 – 14.00 LUNCH BREAK

14.00 - 15.15

Session FC: **WAVEGUIDES I**
Session Chair: Graham T. Reed, *University of Surrey, Guildford, Surrey, UK*

FC1 14.00 - 14.30 (Invited)

Terahertz Integrated Photonic Crystal Devices, D. W. Prather and C. Lin*, University of Delaware, Newark, DE, USA*

Research in the THz region of the electromagnetic spectrum has received significant attention because of its unique applications. In this paper we present several such devices implement using THz photonic crystals.

FC2 14.30 - 14.45

Silicon Electro-Optic Switches using Microring Resonators with Phase-Tunable Feedback, L. Zhou and A. W. Poon*, Hong Kong University of Science and Technology, Kowloon, Hong Kong*

We report a silicon electro-optic switch using a microring resonator with phase-tunable feedback. We show a wide mode spacing of four-times the ring free-spectral range. The carrier-induced blue-shifted resonance maintains a high extinction ratio.

FC3 14.45 - 15.00

Advanced Concepts in Waveguide Spectrometers, P. Cheben, J. H. Schmid, A. Bogdanov*, National Research Council, Ottawa, ON, Canada*, M. L. Calvo*, Universidad Complutense de Madrid, Madrid, Spain*, A. Delage, A. Densmore, S. Janz, B. Lamontagne, J. Lapointe*, National Research Council, Ottawa, ON, Canada*, O. M. Matos*, Universidad Complutense de Madrid, Madrid, Spain*, E. Post, I. Powell*, National Research Council, Ottawa, ON, Canada*, J. A. Rodrigo*, Universidad Complutense de Madrid, Madrid, Spain*, P. Waldron and D.-X. Xu*, National Research Council, Ottawa, ON, Canada*

We present several new concepts to extend the capabilities of arrayed waveguide grating spectrometers. Waveguides with strong lateral mode confinement in the focal plane are used to increase resolution, a Michelson-type AWG can improve optical throughput, and AWG dispersion can be magnified many times by modifying the waveguide group index.

FC4 15.00 - 15.15

Stress-induced SOI Polarization Splitter Based on Mach-Zehnder Interferometers (MZI), W. N. Ye*, Carleton University, Ottawa, ON, Canada*, D.-X. Xu, S. Janz, P. Waldron*, National Research Council, Ottawa, ON, Canada* and N. Tarr*, Carleton University, Ottawa, ON, Canada*

Novel Mach-Zehnder interferometer based polarization splitters in the silicon-on-insulator platform are reported and fabricated. These passive devices employ cladding stress induced birefringence to achieve polarization splitting or filtering function.

15.15 – 15.45 COFFEE BREAK

15.45 - 17.00

Session FD: **WAVEGUIDES II**
Session Chair: TBD

FD1 15.45 - 16.15 (Invited)

Optical Printed Circuit Board (O-PCB) as an Inter-Chip Optical Interconnection Platform, E.-H. Lee*, Inha University, Nam-ku, Incheon, Korea*

We report on the original design and fabrication of optical printed circuit boards (O-PCBs), which we use as inter-chip optical interconnection platform to integrate micro/nano-photonic devices/circuits made of silicon, photonic crystals, and plasmonic structures.

FD2 16.15 - 16.30

Low-Loss Amorphous Silicon Channel Waveguides for Integrated Photonics, D. K. Sparacin, R. Sun, A. M. Agarwal, M. A. Beals, J. Michel, L. C. Kimerling*, Massachusetts Institute of Technology, Cambridge, MA, USA*, T. J. Conway, A. T. Pomerene, D. N. Carothers, M. J. Grove*, BAE Systems, Arlington, VA, USA*, D. M. Gill, M. S. Rasras, S. S. Patel and A. E. White*, Lucent Technologies, Murray Hill, NJ, USA*

Amorphous silicon, single-mode, channel waveguides were fabricated and measured with transmission losses as low as 6.5 dB/cm for the TE mode and 4.5 dB/cm for the TM mode. Variations in the PECVD a-Si deposition conditions yielded a-Si materials with bulk losses < 1 dB/cm.

FD3 16.30 - 16.45

Beating the Heat: Controlling Thermal Effects in Plasma Dispersion Tuned SOI Waveguide Devices, N. Tarr*, Carleton University, Ottawa, ON, Canada*, P. Waldron*, National Research Council, Ottawa, ON, Canada*, H. Panesar, T. Smy*, Carleton University, Ottawa, ON, Canada* and P. E. Jessop*, McMaster University, Hamilton, ON, Canada*

Using numerical thermal and semiconductor device modeling, guidelines for the design of bipolar SOI waveguide devices in which plasma dispersion tuning dominates over thermooptic tuning are developed and tested experimentally

FD4 16.45 - 17.00

Integrated Reconfigurable Optical Add-Drop Multiplexer (R-OADM) based on Silicon Nano-Photonic Waveguides, T. Chu*, Optoelectric Industry & Technology Development Association, Tsukuba, Ibaraki, Japan*, H. Yamada, A. Gomyo, J. Ushida*, NEC Corporation, Tsukuba, Ibaraki, Japan*, S. Ishida and Y. Arakawa*, University of Tokyo, Meguro, Tokyo, Japan*

Based on silicon 2D photonic crystals and photonic-wire waveguides, a compact reconfigurable optical add-drop multiplexer was demonstrated through thermo-optic effect. The 3-dB dropping bandwidth was 5 nm and the dropping extinction ratio was 40 dB.

END OF PROGRAM