IPRA/NPIS

Integrated Photonics Research and Applications

April 11-13, 2005

and

Nanophotonics for Information Systems

April 13-15, 2005

Collocated Topical Meetings
and Tabletop Exhibit

Hilton San Diego Resort
San Diego, California, USA

Sponsored by: Optical Society of America

IPRA Technical Program Committee

Organizing Committee

Louay Eldada, *DuPont Photonics Tech.*, USA, **General Chair**
Richard M. Osgood, Jr., *Columbia Univ., USA*, **Program Chair**
Robert Scarmozzino, *RSoft Design Group, USA*, **Program Chair**

1. Active and Compound Semiconductor Devices

Larry Coldren, *Univ. of California, Santa Barbara, USA,* **Subcommittee Chair**
Dieter Bimberg, *Technische Univ. Berlin, Germany*
Joe Campbell, *Univ. of Texas, USA*
Rick Clayton, *Bookham Tech., USA*
James Coleman, *Univ. of Illinois, USA*
Gregory Fish, *Agility Communications Inc., USA*
Stephen Forrest, *Princeton Univ., USA*
John Marsh, *Intense Photonics, Ltd., UK*
Yoshiaki Nakano, *Univ. of Tokyo, Japan*
Tiramula Ranganath, *Agilent Laboratories, USA*
Monique Renaud, *Avanex, France*

2. Dielectric Waveguides and Waveguide Devices

Richard Penty, *Cambridge Univ., UK,* **Subcommittee Chair**
Ray Chen *, UMBC, USA*
Mark Earnshaw, *Lucent Tech., USA*
James Grote, *Air Force Research Lab., USA*
Norbert Keil, *Fraunhofer Inst., Germany*
Masanori Koshiba , *Hokkaido Univ., Japan*
Christi Madsen, *Texas A&M Univ., USA*
Edwin Y.B. Pun, *City Univ. of Hong Kong, Hong Kong*
Graham T. Reed, *Univ. of Surrey, UK*
Steve Spector, *MIT Lincoln Labs., USA*
Hiroyuki Yamazaki, *NEC Corp. Japan*

3. Modeling, Numerical Simulation and Theory

Anand Gopinath, *Univ. of Minnesota, USA*, **Subcommittee Chair**
Trevor Benson, *Univ. of Nottingham, UK*
Youngchul Chung, *Kwangwoon Univ., Korea*
G. Ronald Hadley, *Sandia National Lab., USA*
Hugo E. Hernandez-Figueroa, *FEEC-DMO, Brazil*
Ya Yan Lu, *City Univ. of Hong Kong, China*
Masaya Notomi, *NTT Basic Res. Labs., Japan*
Klaus Petermann, *Technical Univ. Berlin, Germany*
Azizur B.M. Rahman, *City Univ. London, UK*
Junji Yamauchi, *Hosei Univ., Japan*

4. Nanophotonics and Microphotonics

Gregory Nordin*, Univ. of Alabama, Huntsville, USA*, **Subcommittee Chair**
John M. Ballato, *Clemson Univ., USA*
Yong-Hee Lee, *KAIST, Korea*
John D. O'Brien, *Univ. of Southern California, USA*
Marco Romagnoli, *Pirelli, Italy*
Axel Scherer, *CalTech, USA*
Vladimir Shalaev, *Purdue Univ., USA*

NPIS Technical Program Committee

Organizing Committee

Yeshaiahu Fainman, *Univ. of California, San Diego, USA,* General Chair
Dennis Prather, *Univ. of Delaware, USA,* Program Chair

Roel Baets, *Ghent Univ., Belgium*
Steven Brueck, *Univ. of New Mexico, USA*
Daniel Dapkus, *USC, USA*
Yoel Fink, *MIT, USA*
Hans-Peter Herzig, *Inst. of Microtechnique, Switzerland*
P. Lalanne, *Inst. d'Optique/CNRS, France*
Michal Lipson, *Cornell Univ., USA*
Joseph Mait, *U.S. Army Res. Lab., USA*
Susumu Noda, *Kyoto Univ., USA*
Lukas Novotny, *Univ. of Rochester, USA*
Axel Scherer, *CalTech, USA*
Vladimir Shalaev, *Purdue Univ., USA*
Elias Towe, *Carnegie Mellon Univ., USA*
Yurii Vlasov, *IBM T.J. Watson Res. Ctr., USA*
Willem L. Vos, *Univ. of Twente, The Netherlands*
Eli Yablonovitch, *UCLA, USA*
Nikolay Zheludev, *Univ. of Southampton, UK*

About IPRA

Monday, April 11-Wednesday, April 13, 2005

The Integrated Photonics Research and Applications topical meeting will celebrate its 25th anniversary in 2005. This topical meeting will cover all aspects of research in integrated photonics featuring innovative science and engineering results on active and compound semiconductor devices, dielectric waveguides and waveguide devices, modeling and numerical simulation, and nanophotonics and microphotonics. Application areas within the scope of this meeting include telecommunications, data communications, optical computing, optical storage, displays and sensing.

IPRA Meeting Topics

Topics to be covered:

Active and Compound Semiconductor Devices: Active III-V semiconductor devices, compound semiconductor modulators, filters, switches, wavelength converters, VCSELs, planar amplifiers, photonic integrated circuits and optoelectronic integrated circuits, compound semiconductor WDM components, novel III-V quantum optoelectronic devices, III-V materials and processing for photonics, reliability advances and issues, emerging packaging technologies.

Dielectric Waveguides and Waveguide Devices: Integrated planar waveguides, silicon-based photonics, polymer-based waveguide devices, active/passive integrated components, switches, variable optical attenuators, modulators, filters, integrated isolators and circulators, planar dispersion compensators, materials and fabrication technologies for photonic integrated circuits, characterization of linear and nonlinear optical waveguide devices, micro-machines and micro-optic components, parallel optical interconnects, reliability advances and issues, novel assembly and manufacturing techniques.

Modeling, Numerical Simulation and Theory: Optical system modeling, numerical and semi-analytical methods for guided-wave optics, active, passive and nonlinear component modeling, WDM component design, advances in computational algorithms, physics and coupled models for integrated photonic circuits.

Nanophotonics and Microphotonics: Simulation, modeling and experimental characterization of photonic band-gap, microcavity and other high confinement structures, waveguides, resonators, filters, add-drop integrated optical circuits, metallic and metallodielectric plasmonics.

About NPIS

Wednesday, April 13-Friday, April 15, 2005

The topical meeting on Nanophotonics for Information Systems provides intellectual and technological exchange between scientists, engineers and technologists in various fields of optics that utilize materials, devices and subsystems on the scale ranging from individual atoms, molecules or their clusters on the nanoscale to subwavelength scale.

Scope

Nanophotonics concerns with the generation, transport, transformation, processing and detection of optical fields and their interaction with electronic states on the nanoscale, which may become critical technology in the 21st century. It involves science and engineering of materials, devices and subsystems on the scale ranging from individual atoms, molecules or their clusters on the nanoscale to subwavelength scale inhomogeneous media. Such spatial confinement may lead to the discovery of new phenomena in physics, chemistry and biology that in turn may find numerous industrial and military applications including information technology, telecommunications, environmental monitoring, biomedical science and instrumentation, and quantum information processing and communication.

NPIS Meeting Topics

Inhomogeneous materials (e.g., composite dielectrics, semiconductors, metals and metallodielectrics)

- Anisotropic
- Dispersive
- Efficient light extraction
- Nonlinear optical materials
- Dynamically configurable

Nano-engineered devices for generation, transport, and detection of light

- Resonators
- Light sources
- Quantum information
- Modulators
- Nano-MEMS
- Biophotonics, Biological and chemical transducers and sensors

- Efficient mode matching

Nanofabrication technology

- Lithography techniques
- Growth and deposition approaches
- Self-organized methods Etching

Characterization tools on the nanoscale

Modeling and simulation tools

Photonic crystals, waveguides, and fibers

IPRA Invited Speakers

The following are confirmed invited speakers for IPRA:

Plenary Speakers

- IMA1, **The Potential Benefits of Integrated Photonics in the Computing Platform**, *Jerry Bautista, Intel Corp., USA*
- IMA2, **DARPA's Programs on Photonic Integration**, *Jagdeep Shah, Defense Advanced Res. Projects Agency, USA*

Active and Compound Semiconductor Devices

- IMC1, **Integration Techniques for InP-Based High-Functionality Photonic Integrated Circuits**, *Milan Masanovic, Univ. of California at Santa Barbara, USA*
- IMC6, **All Optical Switching in GaInAsP/InP DFB Waveguides**, *Tetsuya Mizumoto[1], J. K. Seo[1], Shigehisa Arai[1], Yoshiaki Nakano[2]; [1]Tokyo Inst. of Technology, Japan, [2]Univ. of Tokyo, Japan*
- IWB1, **Photonic Integrated Circuits**, *M. K. Smit, Eindhoven Univ. of Technology, Netherlands*
- IWB2, **In-P-Based Photonic Integrated Circuits**, *Ronald Kaiser, Helmut Heidrich; Fraunhofer-Inst. für Nachrichtentechnik, Germany*
- IWB3, **GainNAs SOAs for Photonic Integrated Circuits**, *Tsukuru Katsuyama, Jun-ichi Hashimoto, Kenji Koyama, Yukihiro Tsuji, Akira Ishida; Sumitomo Electric Industries Ltd., Japan*
- IWB4, **Indium-Phosphide-Based Mutation-Designed Optical Waveguides for Application**, *Joseph H. Abeles, Ralph D. Whaley Jr., Martin H. Kwakernaak, Viktor B. Khalfin, Winston K. Chan, Zane A. Shellenbarger, Allen N. Lepore, Nagendranath Maley; Sarnoff Corp., USA*
- IWD1, **Photonic Integrated Balanced Receivers**, *Andreas Umbach, u2t Photonics AG, Germany*
- IWD2, **Photonic Integrated Circuits for RF Analog Links, WDM and Other Advanced Applications**, *Stephen R. Forrest, Princeton Univ., USA*
- IWD3, **High Sensitivity Bio-Sensor Based on an Etched Fiber Bragg Grating**, *Mario Dagenais, Athanasios N. Chryssis, Simarjeet S. Saini, Sang M. Lee, Hyunmin Yi, William E. Bentley; Univ. of Maryland, USA*

- IWF1, **Widely Tunable Integrated DBR Laser Array**, *Shinji Tsuji, Hitachi Central Res. Lab, Japan*
- IWF4, **Monolithic Integrated Tunable Transmitters**, *Yuliya A. Akulova, Greg A. Fish, Hong Hu, Eric Hall, Mike C. Larson, Patrick Abraham, Hugues Marchand, Chuck Turner, Chris Coldren, Eric Hegblom, Tim A. Strand, Larry A. Coldren; Agility Communications Inc., USA*

Dielectric Waveguides and Waveguide Devices

- IMB1, **Enabling Technologies for Silicon-Based Microphotonics**, *Siegfried Janz, Natl. Res. Council Canada, Canada*
- IMB4, **Fast Thermo-Optic Phase Shifters in SOI**, *Michael Geis, MIT, USA*
- IMD5, **Nonlinear Optics in Slow-Light Waveguide Structures**, *Steve Blair, Univ. of Utah, USA*
- ITuA1, **Integrated and Optical Device Applications and Novel Processing for Polymers**, *John Rogers, Univ. of Illinois at Urbana/Champaign, USA*
- ITUF1, **Low-Loss Compact Silica-Based AWG Using Deep Ridge Waveguide**, *Masaki Kohtoku, NTT, Japan*
- IWA1, **Microwave Packaging of High-Speed Semiconductor Lasers**, *Ning Hua Zhu[1], Shang Jian Zhang[1], Cheng Chen[1], Yu Liu[1], Chao Liu[1], Edwin Yu Pun[2], Po-Sheun Chung[2]; [1]Inst. of Semiconductors, Chinese Acad. of Sciences, China, [2]Dept. of Electronic Engineering, City Univ. of Hong Kong, China*
- IWA4, **Packaging of Integrated Optics Devices**, *Hongdu Liu, Photonic Manufacturing Service Ltd., China*
- IWE1, **Light in Microresonators and Chaos Theory**, *Evgenii Narimanov, Princeton Univ., USA*

Modeling, Numerical Simulation and Theory

- IME1, **Modeling and Simulation of High-Density Photonic Integrated Circuits**, *Wei-Ping Huang, Ningning Feng, Dong Zhou, Kai Jiang, Chenglin Xu; McMaster Univ., Canada*
- IME4, **Modeling of All-Optical Flip-Flop Bistable Laser Diodes Using the Finite-Difference Beam-Propagation Method**, *Mitsuru Takenaka, Maura Raburn, Yoshiaki Nakano; Univ. of Tokyo, Japan*
- IMG1, **Numerical Modelling of Integrated Optical Components for Ultrafast Photonic Applications**, *Ian White, Univ. of Cambridge, UK*

- ITuB1, **Photonic Crystal Device Design: A Heterostructure/Effective Medium Picture**, *Edward Sargent, Emanuel Istrate; Univ. of Toronto, Canada*
- ITuB5, **Planar Photonic Crystal (PhC) and Photonic Wire (PhW) Device Structures: What Are the Simulation Issues?** *Richard De La Rue, Nigel Johnson, Chongjun Jin, Pierre Pottier, Harold Chong, Marco Gnan, Aju Jugessur, Edilson Camargo, Grant Erwin, Ahmad Md Zain, Iraklis Ntakis; Univ. of Glasgow, United Kingdom*
- ITuD1, **Time-Domain Beam Propagation Method Applied to Nonlinear Photonic Crystal Waveguide Devices**, *Masanori Koshiba, Hokkaido Univ., Japan*
- IWC1, **Techniques for Large-Scale Simulations: A Review on Some Recent Advances**, *Fernando L. Teixeira, Ohio State Univ., USA*
- IWC2, **Applications for the Unstructured Transmission Line Modeling (TLM) Method in Optoelectronics**, *Phillip Sewell, Univ. of Nottingham, UK*

Nanophotonics and Microphotonics

- IMF1, **Integrated Micro/Nano-Optical Biosensor Devices Si CMOS Compatible for Microsystem Applications**, *Laura M. Lechuga[1], Borja Sepúlveda[1], José Sánchez del Río[1], Francisco J. Blanco[2], Ana Calle[1], Carlos Domínguez[1]; [1]Spanish Council for Scientific Res., Spain, [2]KERLAN S. Coop., Spain*
- IMF3, **Planar Lightwave Circuit Amplifier Arrays**, *Allan Bruce, In-Plane Photonics, USA*
- ITuC1, **Si Raman Laser**, *Barham Jalali, Ozdal Boyraz, Dimitri Dimitropoulos, Varun Raghunathan; Univ. of California at Los Angeles, USA*
- ITuC2, **Controlling Light with Light in On-Chip Nanophotonic Structures**, *Michal Lipson, Cornell Univ., USA*
- ITuE1, **Photonic Crystals: Controlling Spectral, Spatial and Reciprocal Properties of Light**, *Shanhui Fan, Mehmet Fatih Yanik, Xiaofang Yu, Jonghwa Shin, Zheng Wang; Stanford Univ., USA*
- ITuE2, **Surface Plasmon Polaritons for Nanometric Photonic Circuits**, *Yoshitada Katagiri[1], Hiroyuki Shinojima[1], Hiroshi Fukuda[1], Toh-ichiro Goto[1], Yoshiaki Nakano[2], Ikutaro Kobayashi[2]; [1]NTT Microsystem Integration Labs, Japan, [2]Univ. of Tokyo, Japan.*
- ITuG1, **Photonic Crystal Lasers**, *Sven Mahnkopf, Univ. of Wurzburg, Germany*

- ITuG2, **Photonic Crystal Confined Vertical Cavity Lasers and Arrays**, *Kent D. Choquette, A. J. Danner, J. J. Raftery, P. O. Leisher; Univ. of Illinois, USA*

NPIS Invited Speakers

The following are confirmed invited speakers for NPIS:

- JWA1, **Recent Advances in Silicon Photonic Components**, *Richard Soref, AFRL, USA*
- JWA2, **To Be Determined**, *Harry Atwater, Caltech, USA*
- NWA7, **Index Materials: New Frontiers in Optics**, *Costas M. Soukoulis[1], E. N. Economou[2]; [1]Iowa State Univ. and Ames Lab, USA, [2]IESL-FORTH, Greece*
- NWB1, **Novel Structures for High Confinement in Sub-Wavelength Regions**, *Michal Lipson, Jacob T. Robinson, Qianfan Xu, Vilson Almeida, Hod Lipson; Cornell Univ., USA*
- NWC1, **To Be Determined**, *Yoel Fink, MIT, USA*
- NWC2, **Semiconductor-Based Active and Passive Nanophotonics**, *Richard De La Rue[1], Marc Sorel[1], Nigel Johnson[1], Faiz Rahman[1], Charles Ironside[1], Lee Cronin[1], Ian Watson[2], Robert Martin[2], Chongjun Jin[1], Pierre Pottier[1], Harold Chong[1], Marco Gnan[1], Aju Jugessur[1], Edilson Camargo[1], Grant Erwin[1], Ahmad Md Zain[1], Iraklis Ntakis[1], Lois Hobbs[1], Dominique Coquillat[3]; [1]Univ. of Glasgow, UK, [2]Univ. of Strathclyde, UK, [3]Univ. de Montpellier II, France*
- NThA1, **To Be Determined**, *Steven G. Johnson, MIT, USA*
- NThB1, **Photonic Nanostructures and Devices Based on Photonic Crystals**, *Susumu Noda; Kyoto Univ., Japan*
- NThC1, **Integration of Functional Optical Devices Using Photonic Crystals**, *Axel Scherer; Caltech, USA*
- NThD1, **To Be Determined**, *Benjamin Eggleton, Univ. of Sydney, Australia*
- NThD2, **Novel Nonlinear Interactions in Photonic Crystal Fibers**, *Alexander Gaeta, Cornell Univ., USA*
- NFA3, **Strong Coupling between a Single Quantum Dot and a Photonic Crystal Slab Nanocavity**, *Hyatt M. Gibbs, Univ. of Arizona, USA*

- NFA5, **Compound Semiconductor Nanowires as Building Blocks for Nanophotonics**, *Deli Wang; Univ. of California at San Diego, USA*

Publications

Conference Program

The *Conference Program* is currently available and can be found online. The printed program will be available onsite at the meeting.

Technical Digest on CD-ROM

The IPRA/NPIS *Technical Digest* will contain PDFs of paper summaries presented during both meetings as they were submitted by the authors; the *Technical Digest* will be produced only on CD-ROM. At the meeting, each registrant will receive a copy of this CD.

Postdeadline Paper Presentations

Copies of the accepted IPRA or NPIS postdeadline paper presentations will be provided to all attendees during the meetings. The IPRA postdeadline papers will be available on Tuesday, April 12 in the afternoon. The NPIS postdeadline papers will be available on Thursday, April 14, also in the afternoon.

Agenda of Sessions

On This Page:

Sunday, April 10, 2005

Time	Event/Location
3:00 PM –6:00 PM	Registration *International Ballroom Foyer*

Monday, April 11, 2005

Time	Event/Location
7:00 AM – 5:00 PM	Registration *International Ballroom Foyer*
8:15 AM – 10:00 AM	**IMA**: IPRA Plenary Session *St. Tropez and Monte Carlo*
10:00 AM – 10:30 AM	Beverage Break *International Ballroom Foyer*
10:30 AM – 12:30 PM	**IMB**: Silicon-Based Microphotonics *Sorrento and San Marino*
10:30 AM – 12:30 PM	**IMC**: Monolithic Wavelength Converters *Capri and Riviera*
12:30 PM – 2:00 PM	Lunch Break (on your own)
2:00 PM – 3:30 PM	**IMD**: Nonlinear Optics and Microchannels *Sorrento and San Marino*
2:00 PM – 3:30 PM	**IME**: Beam Propagation Method, *Capri and Riviera*

3:30 PM – 4:00 PM	Beverage Break *International Ballroom Foyer*
4:00 PM – 5:30 PM	**IMF**: Micro- and Nanophotonics Applications *Capri and Riviera*
4:00 PM –5:45 PM	**IMG**: Techniques for Modeling of Optical Components *Capri and Riviera*

Tuesday, April 12, 2005

Time	Event/Location
7:30 AM – 5:00 PM	Registration *International Ballroom Foyer*
8:15 AM – 10:00 AM	**ITuA**: Polymer Components *Sorrento and San Marino*
8:15 AM – 10:00 AM	**ITuB**: Modeling of Photonic Crystal Guides and Devices *Capri and Riviera*
10:00 AM – 10:30 AM	Beverage Break and Exhibits *Terrazza Ballroom*
10:30 AM – 12:30 PM	**ITuC**: Nanophotonics *Sorrento and San Marino*
10:30 AM – 12:30 PM	**ITuD**: Finite Element and Filter Modeling *Capri and Riviera*
12:30 PM – 2:00 PM	Lunch Break (on your own)
2:00 PM – 3:30 PM	**ITuE**: Photonic Crystals I *Sorrento and San Marino*
2:00 PM – 3:30 PM	**ITuF**: Multiplexing Technologies *Sorrento and San Marino*
3:30 PM – 4:00 PM	Beverage Break and Exhibits *Terrazza Ballroom*
4:00 PM – 5:15 PM	**ITuG: Photonic Crystals II** *Capri and Riviera*
5:30 PM – 7:00 PM	IPRA Conference Reception *South Poolside*

Wendesday, April 13, 2005

Time	Event/Location
7:00 AM – 5:00 PM	Registration *International Ballroom Foyer*
8:00 AM – 10:00 AM	**JWA**: Joint IPRA/NPIS Oral Session: Frontiers in Nanophotonics *St. Tropez and Monte Carlo*
10:00 AM – 10:30 AM	Beverage Break and Exhibits *Terrazza Ballroom*
10:30 AM – 12:30 PM	**NWA**: Plasmonics *St. Tropez and Monte Carlo*
10:30 AM – 12:30 PM	**IWA**: Packaging and High-Speed Performance Sorrento and San Marino
10:30 AM – 12:30 PM	**IWB**: Functional Photonic Integrated Devices *Capri and Riviera*
12:30 PM – 2:00 PM	Lunch Break (on your own)
2:00 PM – 3:30 PM	**NWB**: Silicon Nanophotonics *St. Tropez and Monte Carlo*
2:00 PM – 3:30 PM	**IWC**: FDTD, TLM and Eigenmode Expansion Methods *Sorrento and San Marino*
2:00 PM – 3:30 PM	**IWD**: Integrated Receivers and Sensors *Capri and Riviera*
3:30 PM – 4:00 PM	Beverage Break and Exhibits *Terrazza Ballroom*
4:00 PM – 5:00 PM	**NWC**: Photonic Crystal Modalities *St. Tropez and Monte Carlo*
4:00 PM – 5:15 PM	**IWE**: Microcavities *Sorrento and San Marino*
4:00 PM – 5:45 PM	**IWF**: Integrated Transmitters and Lockers *Sorrento and San Marino*
5:30 PM – 7:00 PM	**IWG**: IPRA Poster Session and Exhibits *Terrazza Ballroom*

Thursday, April 14, 2005

Time	Event/Location
7:30 AM – 5:00 PM	Registration *International Ballroom Foyer*
8:00 AM – 10:00 AM	**NThA**: Modeling and Design for

	Nanophotonics *Sorrento and San Marino*
10:00 AM – 10:30 AM	Beverage Break and Exhibits *Terrazza Ballroom*
10:30 AM – 12:00 PM	**NThB**: Photonic Crystal Devices *Sorrento and San Marino*
12:00 PM – 2:00 PM	Lunch Break (on your own)
2:00 PM – 3:30 PM	**NThC**: Photonic Crystal Integration Platform *Sorrento and San Marino*
3:30 PM – 4:00 PM	Beverage Break and Exhibits *Terrazza Ballroom*
4:00 PM – 5:15 PM	**NThD**: Nanophotonic Fibers *Sorrento and San Marino*
5:30 PM – 7:00 PM	NPIS Conference Reception *South Poolside*

Friday, April 15, 2005

Time	Event/Location
7:30 AM – 12:00 PM	Registration *International Ballroom Foyer*
8:00 AM – 10:00 AM	**NFA**: Frontiers in Quantum Nanophotonics I *Sorrento and San Marino*
10:00 AM – 10:30 AM	Beverage Break and Exhibits *International Ballroom Foyer*
10:30 AM – 11:30 AM	**NFB**: Frontiers in Quantum Nanophotonics II *Sorrento and San Marino*

IPRA Abstracts

Sunday, April 10, 2005

International Ballroom Foyer
3:00 p.m.–6:00 p.m.
Registration

Monday, April 11, 2005

International Ballroom Foyer
7:00 a.m.–5:00 p.m.
Registration

St. Tropez and Monte Carlo
8:00 a.m.–8:30 a.m.
Opening Remarks and OSA Overview

St. Tropez and Monte Carlo
8:30 a.m.–10:00 a.m.
IMA • IPRA Plenary Session

IMA1 • 8:30 a.m. Plenary
The Potential Benefits of Integrated Photonics in the Computing Platform
Jerry Bautista; Intel Corp., USA.

IMA2 • 9:15 a.m. Plenary
DARPA's Programs on Photonic Integration
Jagdeep Shah; Defense Advanced Res. Projects Agency, USA.
Photonic integration is an enabling technology for many applications of photonics. This talk will describe DARPA/MTO's many challenging programs in this area. These include both III-V and CMOS-compatible Silicon platforms.

International Ballroom Foyer
10:00 a.m.–10:30 a.m.
Beverage Break

Sorrento and San Marino
10:30 a.m.–12:30 p.m.
IMB • Silicon-Based Microphotonics
Steven Spector; MIT, USA, Presider

IMB1 • 10:30 a.m. Invited
Enabling Technologies for Silicon-Based Microphotonics
Siegfried Janz; Natl. Res. Council Canada, Canada.
We review recent work on enabling technologies for silicon-on-insulator waveguide devices. Topics include planar graded-index waveguide couplers, polarization management using stress, and the problem of acquiring optical signals from a large number of output channels.

IMB2 • 11:00 a.m.
Ge-Nanoclusters Embedded in Ge-Doped Sililca-on-Silicon Waveguides
Haiyan Ou[1,2], Troels P. Rørdam[1], Karsten Rottwitt[1], Flemming Grumsen[2], Andy Horsewell[2]; [1]COM Center, Technical Univ. of Denmark, Denmark, [2]Dept. of Manufacturing Engineering and Management, Technical Univ. of Denmark, Denmark.

Ge-nanoclusters were formed by electron-beam irradiation in Ge-doped silica-on-silicon thin films. The size and density of the clusters can be controlled by the irradiation intensity and time.

IMB3 • 11:15 a.m.
Dispersion Compensator Using a Compact Arrowhead Arrayed-Waveguide Grating
Takanori Suzuki, Kenichi Masuda, Hiroyuki Tsuda; Keio Univ., Japan.
A novel chromatic dispersion compensator based on a compact arrowhead arrayed-waveguide grating structure is proposed and fabricated. The chromatic dispersion, the bandwidth and the insertion loss are 120 ps/nm, 70 GHz and 7.51 dB, respectively.

IMB4 • 11:30 a.m. Invited
Fast Thermo-Optic Phase Shifters in SOI
Michael Geis; MIT, USA.
Directly heated thermal switches switch in < 50 ns at powers of 0.1 to 5.5 mW. Modeling shows switching times < 1 ns can be obtained with powers less than with other integrated circuit technologies.

IMB5 • 12:00 p.m.
Silica Waveguide Electrooptic Modulator with DC-Coupled Traveling-Wave Electrode
Richard W. Ridgway, David Nippa, Steven Risser, Vincent McGinniss; Optimer Photonics Inc., USA.
Electrooptically-clad silica waveguides with DC-coupled traveling-wave electrodes and voltage-biased ground planes are used to form an optical modulator operating at 500 MB/s with an extinction ratio of 15 dB.

IMB6 • 12:15 p.m.
Amplitude Apodization in Lithographically-Scribed Planar Waveguide Holograms via Correlated Line Set Displacement
Thomas W. Mossberg, Dmitri Iazikov, Christoph Greiner; LightSmyth Technologies, USA.
Flexibility in the design of slab waveguide holograms demands an amplitude apodization means compatible with binary-etch-depth photolithographic fabrication. We discuss principles and implementation of one such amplitude apodization means based on correlated diffractive line sets.

Capri and Riviera
10:30 a.m.–12:30 p.m.
IMC • Monolithic Wavelength Converters
Gregory Fish; Agility Communications Inc., USA, Presider

IMC1 • 10:30 a.m. Invited
Integration Techniques for InP-Based High-Functionality Photonic Integrated Circuits
Milan Masanovic; Univ. of California at Santa Barbara, USA.
In this paper, we review photonic integration platforms and techniques in InP. These platforms include offset quantum-well and novel quantum-well intermixing and dual quantum-well approaches used at UCSB to fabricate various high-functionality photonic integrated circuits.

IMC2 • 11:00 a.m.
Experimental Demonstration at 10Gbit/s of a 2R-Regenerator Based on the Mutual Optical Feedback between a Laser Diode and an SOA
Wouter D'Oosterlinck[1], Sam Verspurten[1], Geert Morthier[1], Roel Baets[1], Meint K. Smit[2]; [1]Ghent Univ., Belgium, [2]COBRA Res. Inst., Technische Univ. Eindhoven, Netherlands.
A new regenerator concept based on the feedback between a laser diode and an SOA has been tested using an integrated version. Excellent regenerator characteristics, both static and 10Gbit/s dynamic operation, have been obtained.

IMC3 • 11:15 a.m.
10Gbps Monolithically Integrated Widely Tunable Wavelength Converter Using Quantum Well Intermixing
Vikrant Lal, Milan L. Masanovic, Erik J. Skogen, James W. Raring, Joseph A. Summers, Larry A. Coldren, Daniel J. Blumenthal; Univ. of California at Santa Barbara, USA.

We report on the implementation and performance of an InP centered quantum well intermixed, MZI-SOA all-optical wavelength-converter monolithically-integrated with an SGDBR. We show error-free operation at 10Gbps, and 3dBm output power over 30nm output tuning.

IMC4 • 11:30 a.m.
Multifunctional Integrated Photonic Switches for Nanosecond Packet-Switched Wavelength Conversion
Onur Fidaner[1], Hilmi V. Demir[1], Vijit A. Sabnis[1], James S. Harris[1], David A. Miller[1], Jun Fei Zheng[2]; [1]Stanford Univ., USA, [2]Intel Corp., USA.
We report multifunctional integrated photonic switches that provide optical wavelength conversion across the C-band at 3.5 Gb/s that is electrically packet-switched within a reconfiguration time of <2.5ns. These switches also provide optical packet-switching in <300ps.

IMC5 • 11:45 a.m.
Widely Tunable All-Optical Wavelength Converter Monolithically Integrated with a Total Internal Reflection Corner Mirror Delay Line for 40Gbps RZ Operation
Joseph A. Summers, Vikrant Lal, Milan L. Masanovic, Nadir Dagli, Larry A. Coldren, Daniel J. Blumenthal; Univ. of California at Santa Barbara, USA.
This paper reports on a novel widely tunable all-optical wavelength converter monolithically integrated with a compact turning mirror delay for differential operation at 40Gbps RZ. Wavelength conversion is achieved over 25nm of device tuning range.

IMC6 • 12:00 p.m. Invited
All Optical Switching in GaInAsP/InP DFB Waveguides
Tetsuya Mizumoto[1], J. K. Seo[1], Shigehisa Arai[1], Yoshiaki Nakano[2]; [1]Tokyo Inst. of Technology, Japan, [2]Univ. of Tokyo, Japan.
The all-optical switching device based on an intensity-dependent refractive index change in a GaInAsP/InP highmesa DFB waveguide is investigated with a vertical-groove grating structure. Its temporal response is also investigated with a short pump pulse.

12:30 p.m.–2:00 p.m.
Lunch Break (On Your Own)

Sorrento and San Marino
2:00 p.m.–3:30 p.m.
IMD • Nonlinear Optics and Microchannels
Ray Chen; Univ. of Maryland, Baltimore County, USA, Presider

IMD1 • 2:00 p.m.
Fluorescence Detection in Integrated Intersecting ARROW Waveguides with Liquid and Solid Cores
Dongliang Yin[1], Holger Schmidt[1], John P. Barber[2], Aaron R. Hawkins[2]; [1]Univ. of California at Santa Cruz, USA, [2]Brigham Young Univ., USA.
We present detection of molecular fluorescence from 2-dimensional interconnected solid and liquid-core ARROW waveguides. Cross-coupling efficiencies between waveguides in excess of 99% are feasible. The fully planar geometry is ideal for single-molecule studies on chip.

IMD2 • 2:15 p.m.
Integrated Hollow and Solid-Core Waveguides for Sensor Platforms
John P. Barber[1], Matthew M. Smith[1], Aaron R. Hawkins[1], Dongliang Yin[2], Holger Schmidt[2]; [1]Brigham Young Univ., USA, [2]Univ. of California at Santa Cruz, USA.
We report the fabrication of hollow and solid-core waveguide structures on planar substrates. These structures are suitable for low-loss anti-resonant reflecting (ARROW) and photonic crystal waveguides, and integration with microfluidic or gas-sensing platforms.

IMD3 • 2:30 p.m.
Microchannels for the Integration of Liquid Media in Silica Waveguide Structures

Patrick Dumais, Claire L. Callender, Julian P. Noad, Christopher J. Ledderhof; Communications Res. Ctr. Canada, Canada.
Microchannels are formed in the cladding layer of silica-on-silicon waveguides. Evanescent interactions between parallel waveguides and liquid-filled channels are demonstrated experimentally. Sensor and photonic device applications are outlined.

IMD4 • 2:45 p.m.
Fabrication of Microchannels Integrated with Silica Waveguides
Patrick Dumais, Claire L. Callender, Julian P. Noad, Christopher J. Ledderhof; Communications Res. Ctr. Canada, Canada.
A novel fabrication process for embedded microchannels in borophosphosilicate glass is presented. These channels may be placed in parallel and in close proximity to germanium-doped waveguide cores. Photonic applications of these structures are discussed.

IMD5 • 3:00 p.m. Invited
Nonlinear Optics in Slow-Light Waveguide Structures
Steve Blair; Univ. of Utah, USA.
I will overview our work on enhancing nonlinear optical phenomena in coupled-resonator based slow-light structures. Via a generalized approach for third-order nonlinearities, we have studied nonlinear refraction, Raman amplification, and wavelength conversion.

Capri and Riviera
2:00 p.m.–3:30 p.m.
IME • Beam Propagation Method
Phillip Sewell; Univ. of Nottingham, UK, Presider

IME1 • 2:00 p.m. Invited
Modeling and Simulation of High-Density Photonic Integrated Circuits
Wei-Ping Huang, Ningning Feng, Dong Zhou, Kai Jiang, Chenglin Xu; McMaster Univ., Canada.
Mathematical models and simulation techniques for modeling and simulation of complex photonic devices and integrated circuits made of high index contrast materials and structures are reviewed and discussed.

IME2 • 2:30 p.m.
3D Wide-Angle Beam Propagation Using Complex Jacobi Iteration
G. Ronald Hadley; Sandia Natl. Labs, USA.
A new iterative technique recently developed for solution of the Helmholtz Equation is adapted for solution of 3D wide-angle beam propagation. The method is targeted towards large problems or structures with frequently-changing boundaries.

IME3 • 2:45 p.m.
BPM Simulation of a Branch-Type TE/TM Mode Splitter Using a Light-Guiding Metal Line
Tomohide Yamazaki, Hideaki Aono, Junji Yamauchi, Hisamatsu Nakano; Hosei Univ., Japan.
The characteristics of a TE/TM mode splitter using a light-guiding metal line are investigated through the propagating beam analysis. A short device length of about 180 μm is achievable at a wavelength of 1.55 μm.

IME4 • 3:00 p.m. Invited
Modeling of All-Optical Flip-Flop Bistable Laser Diodes Using the Finite-Difference Beam-Propagation Method
Mitsuru Takenaka, Maura Raburn, Yoshiaki Nakano; Univ. of Tokyo, Japan.
Numerical modeling of all-optical flip-flop multimode interference bistable laser diodes is discussed using the finite-difference beam propagation method extended with the carrier rate equation. All-optical flip-flop operation was analyzed with relatively low computational expenditure.

International Ballroom Foyer
3:30 p.m.–4:00 p.m.
Beverage Break

Sorrento and San Marino
4:00 p.m.–5:30 p.m.
IMF • Micro- and Nanophotonics Applications
Greg Nordin; Univ. of Alabama in Huntsville, USA, Presider

IMF1 • 4:00 p.m. Invited
Integrated Micro/Nano-Optical Biosensor Devices Si CMOS Compatible for Microsystem Applications
Laura M. Lechuga[1], Borja Sepúlveda[1], José Sánchez del Río[1], Francisco J. Blanco[2], Ana Calle[1], Carlos Domínguez[1]; [1]Spanish Council for Scientific Res., Spain, [2]IKERLAN S. Coop., Spain.
Our group is focus on the development of highly sensitive integrated optical biosensors microsystems based on micro/nanotechnologies for real applications. We have fabricated Mach-Zehnder interferometric devices based on evanescent wave detection using two waveguides technologies.

IMF2 • 4:30 p.m.
Radiation-Pressure-Driven Micro-Mechanical Oscillator
Hossein Rokhsari, Tobias J. Kippenberg, Tal Carmon, Kerry J. Vahala; Caltech, USA.
We demonstrate for the first time, self generation of mechanical vibrations at RF frequencies stimulated directly by the radiation pressure of circulating photons within optical micro-cavities.

IMF3 • 4:45 p.m. Invited
Planar Lightwave Circuit Amplifier Arrays
Allan Bruce; In-Plane Photonics, USA.
No abstract provided.

IMF4 • 5:15 p.m.
Narrowband Wavelength Conversion Using FWM in Ultrasmall Silicon-on-Insulator Waveguides
Richard L. Espinola[1], Jerry I. Dadap[1], Richard M. Osgood Jr.[1], Sharee J. McNab[2], Yurii A. Vlasov[2]; [1]Columbia Univ., USA, [2]IBM T. J. Watson Res. Ctr., USA.
We demonstrate narrowband wavelength conversion within the C-band using four-wave-mixing in ultrasmall SOI waveguides. This work exploits silicon's large nonresonant (electronic) $\chi(3)$ to further achieve active on-chip functionality. Initial experiments are compared with theoretical calculations.

Capri and Riviera
4:00 p.m.–5:45 p.m.
IMG • Techniques for Modeling of Optical Components
G. Ronald Hadley; Sandia Natl. Labs, USA, Presider

IMG1 • 4:00 p.m. Invited
Numerical Modelling of Integrated Optical Components for Ultrafast Photonic Applications
Ian White; Univ. of Cambridge, UK.
This paper reviews simulations of integrated components for ultrashort pulse generation, shaping and regeneration. Optimised component designs are reported, minimising the major impact that chirp and saturation effects have even where ultrafast nonlinearities are used.

IMG2 • 4:30 p.m.
Design of Polarization-Independent Wavelength Splitter Based on Single Directional Coupler
Chee Wei Lee, Stevanus Darmawan, Shuh Ying Lee, Mee Koy Chin; Nanyang Technological Univ., Singapore.
We propose the first theoretical design of a novel compact integrated CWDM filter using directional coupler, with polarization-insensitivity based upon strong polarization birefringence in the waveguide. This device is suitable for the emerging PON applications.

IMG3 • 4:45 p.m.
Full Theoretical Analysis of Pulsed SOI Raman Amplifiers
Oliver Chen, Nicolae C. Panoiu, Richard M. Osgood; Columbia Univ., USA.
We present the first full theoretical study of pulsed stimulated Raman scattering in silicon wires. Free carrier and two-photon absorption effects are included. Raman amplification and pulse interaction are also discussed.

IMG4 • 5:00 p.m.
Application of Pseudospectral Methods to Optical Waveguide Mode Solvers
Po-Jui Chiang, Chu-Sheng Yang, Chin-Lung Wu, Chun-Hao Teng, Hung-chun Chang; Natl. Taiwan Univ., Taiwan Republic of China.
A new full-vectorial multidomain pseudospectral mode solver based on pseudospectral methods for optical waveguides with arbitrary step-index profile is presented. The formulations are applied to optical fibers and rib waveguides and remarkable accuracy is demonstrated.

IMG5 • 5:15 p.m.
Numerical Simulation of Surface Plasmon Polaritons Propagating on an Abruptly Bent Interface by Guided-Mode Extracted Integral Equations
Dao N. Chien, Kazuo Tanaka, Masahiro Tanaka; Gifu Univ., Japan.
The properties of reflection, transmission, and scattering of surface plasmon polaritons (SPPs) on an abruptly bent metal-dielectric interface are investigated by means of the boundary-element method (BEM) based on the guided-mode extracted integral equations (GMEIEs).

IMG6 • 5:30 p.m.
Resonant Second Harmonic Generation for Optical Performance Monitoring in DWDM Networks
Moncef B. Tayahi[1], SivaKumar Lanka[1], Banmali S. Rawat[1], Chandrasekhar Roychoudhuri[2]; [1]Univ. of Nevada at Reno, USA, [2]Univ. of Connecticut, USA.
SHG in DWDM systems was used for optical performance monitoring. A poled Lithium-Niobate device is used to convert C/L band channels to 1/2 wavelenghts where Si detectors/CMOS were used to predict performance monitoring parameters.

Tuesday, April 12, 2005

International Ballroom Foyer
7:30 a.m.–5:00 p.m.
Registration

Sorrento and San Marino
8:15 a.m.–10:00 a.m.
ITuA • Polymer Components
To Be Determined, Presider

ITuA1 • 8:15 a.m. Invited
Integrated and Optical Device Applications and Novel Processing for Polymers
John Rogers; Univ. of Illinois at Urbana/Champaign, USA.
We describe some two and three dimensional nanophotonic Structures formed by soft lithography and illustrate their use in microfluidics, sensing and other areas.

ITuA2 • 8:45 a.m.
Normally Dark 1x1 Integrated Optical Switch Based on a Highly Asymmetric Y-branch
Junichiro Fujita, Tomoyuki Izuhara, Antonije M. Radojevic, Reinald Gerhardt, Louay Eldada; DuPont Photonics Technologies, USA.
A normally dark 1×1 switch based on a highly asymmetric Y-branched polymeric waveguide is demonstrated. This device exhibits an attenuation level of 50dB at power-off state and an excess loss of 0.2dB at power-on state.

ITuA3 • 9:00 a.m.
Tomographic Reconstruction of 3D Index Structures in Photopolymer
Amy C. Sullivan, Robert R. McLeod, Matthew W. Grabowski; Univ. of Colorado, USA.
We demonstrate deeply buried localized index structures in photopolymer written by three dimensional direct write lithography. High-fidelity cross-sections of these weak index structures are measured by a new form of diffraction tomography without phase reconstruction.

ITuA4 • 9:15 a.m.
Fabrication of Zero Bending Loss Flexible Film Optical Waveguide by UV Moulding of Sol-Gel Hybrid Materials
Byeong-Soo Bae[1], Woo-Soo Kim[1], Keun Byung Yoon[2]; [1]Korea Advanced Inst. of Science and Technology (KAIST), Republic of Korea, [2]Electronics and Telecommunications Res. Inst. (ETRI), Republic of Korea.
A flexible multi-mode channel waveguide with high Δn is fabricated by UV moulding method with organic-inorganic sol-gel hybrid materials for optical interconnects. Flexiblely bent film waveguide shows no bending loss until 2 mm bending radius.

ITuA5 • 9:30 a.m.
Single-Waveguide Variable Optical Attenuator
David W. Nippa, Richard W. Ridgway, Steven Risser, Vincent McGinniss; Optimer Photonics Inc., USA.
A Kerr-based electrooptic material is used as the top cladding over a silica waveguide to form a variable optical attenuator that provides 20 dB extinction and 1 ms response time within 4 mm of length.

ITuA6 • 9:45 a.m.
Europium-Doped Sesquioxide Waveguides Grown on Al_2O_3 and SiO_2 by Pulsed Laser Deposition
Sebastian Baer, Stefan Ehlert, Yury Kuzminykh, Lutz Rabisch, Bert Neubert, Hanno Scheife, Günter Huber; Univ. of Hamburg, Germany.
We report on high-quality crystalline Eu-doped sesquioxide thin films grown by pulsed laser deposition on sapphire and quartz. Characterization involves XRD, SXRD, RBS, AFM and optical spectroscopy. Waveguiding at different wavelengths was achieved.

Terrazza Ballroom
10:00 a.m.–10:30 a.m.
Beverage Break and Exhibits

Capri and Riviera
8:15 a.m.–10:00 a.m.
ITuB • Modeling of Photonic Crystal Guides and Devices
Hugo H. Figueroa; Univ. Estadual de Campinas, Brazil, Presider

ITuB1 • 8:15 a.m. Invited
Photonic Crystal Device Design: A Heterostructure/Effective Medium Picture
Edward Sargent, Emanuel Istrate; Univ. of Toronto, Canada.
We review use of the method of multiple scales to design, with a high degree of accuracy, photonic crystal heterostructure and photonic crystal defect-based waveguide, coupler, and resonant cavity devices.

ITuB2 • 8:45 a.m.
Self-Localized Waveguides in Nonlinear Photonic Crystals
Bjorn Maes[1], Guy Van der Sande[2], Peter Bienstman[1], Jan Danckaert[2], Roel Baets[1], Irina Veretennicoff[2]; [1]Ghent Univ., Belgium, [2]Vrije Univ. Brussel, Belgium.
We study a new variety of self-localized Bloch modes or gap solitons in Kerr nonlinear high-contrast photonic crystals without defects. In addition to rigorous calculations, we develop a semi-analytical approach using a folded Green's function.

ITuB3 • 9:00 a.m.
Theoretical Prediction of Light-Wave Localization Mechanisms in Metallo-Dielectric Photonic Crystal Circuits
Nikolaos J. Florous, Masanori Koshiba; Hokkaido Univ., Japan.
An efficient analytical approach based on the scattering-matrix technique is presented for the characterization of light-wave localization-mechanisms in photonic crystal circuits composed of frequency-dependent materials. We theoretically predict the localization-mechanism of surface-plasmon-polaritons in photonic crystals.

ITuB4 • 9:15 a.m.
An Analysis of Photonic Crystal Waveguide Gratings Using Coupled-Mode Theory and Finite-Element Method
Takeshi Fujisawa, Masanori Koshiba; Hokkaido Univ., Japan.
Photonic crystal waveguide gratings are analyzed by using a simple coupled-mode theory combined with a finite-element method, and their coupling coefficients and transmission characteristics are effectively evaluated.

ITuB5 • 9:30 a.m. Invited
Planar Photonic Crystal (PhC) and Photonic Wire (PhW) Device Structures: What Are the Simulation Issues?
Richard De La Rue, Nigel Johnson, Chongjun Jin, Pierre Pottier, Harold Chong, Marco Gnan, Aju Jugessur, Edilson Camargo, Grant Erwin, Ahmad Md Zain, Iraklis Ntakis; Univ. of Glasgow, UK.
Photonic-crystal and photonic-wire concepts are being applied to the realisation of guided-wave optical device structures that exploit the availability of precisely defined large refractive-index contrast. This paper considers associated simulation issues from an experimentalist's viewpoint.

Sorrento and San Marino
10:30 a.m.–12:30 p.m.
ITuC • Nanophotonics
Greg Nordin; Univ. of Alabama in Huntsville, USA. Presider

ITuC1 • 10:30 a.m. Invited
Si Raman Laser
Barham Jalali, Ozdal Boyraz, Dimitri Dimitropoulos, Varun Raghunathan; Univ. of California at Los Angeles, USA.
We review the recently developed silicon Raman laser and demonstrate its tunability for the first time. Lasing from 1667nm to 1698nm is observed along with coherent anti-Stokes emission from 1421 nm to 1443 nm.

ITuC2 • 11:00 a.m.
Controlling Light with Light in On-Chip Nanophotonic Structures
Michal Lipson; Cornell Univ., USA.
We show all-optical control of a micron-size ring resonator transmission. The transmission of the structure is modulated by up to 94% in less than 500 ps using light pulses with energies as low as 25 pJ.

ITuC3 • 11:30 a.m.
Nonlinear Optics in High-*Q* SOI Optical Microcavities
Matthew Borselli, Thomas J. Johnson, Oskar Painter; Caltech, USA.
High-quality-factor ($Q>10^6$) silicon optical microdisks are fabricated out of silicon-on-insulator wafers. Optical loss mechanisms are characterized through fiber-taper-probe measurements. Nonlinear effects including Raman and Brillouin scattering, and thermal and free-carrier driven optical bistability are presented.

ITuC4 • 11:45 a.m.
Effect of Loss Mechanisms on Kerr-Nonlinear Resonator Behaviour
Gino R. Priem, Pieter Dumon, Peter Bienstman, Geert Morthier, Roel Baets; Ghent Univ., INTEC, Belgium.
The degradation of Kerr-nonlinear behaviour in resonating structures due to optical loss is investigated. From this, the feasibility of ultrafast, Kerr-nonlinear operation is derived for the AlGaAs and Si material system.

ITuC5 • 12:00 p.m.
Compact Ring Cavity Resonator with Two Total Internal Reflection Mirrors and an Integrated Semiconductor Optical Amplifier
Doo Gun Kim, Jae Hyuk Shin, Cem Ozturk, Jong Chang Yi, Youngchul Chung, Nadir Dagli; Univ. of California at Santa Barbara, USA.
We investigate the properties of the multimode interference coupled ring resonator using half ring and two total internal reflection mirrors. Free spectral range and an on-off ratio are 162 GHz and 13 dB, respectively.

ITuC6 • 12:15 p.m.
Fully-Integrated Planar-Waveguide Resonator Optics Based on Holographic Bragg Reflectors
Christoph Greiner, Dmitri Iazikov, Thomas W. Mossberg; LightSmyth Technologies, USA.
We demonstrate an integrated concentric Fabry-Perot resonator based on holographic Bragg reflectors. The cavity, fabricated in a low-loss silica-on-silicon slab waveguide using high-fidelity deep ultra violet photolithographic fabrication, exhibits a reflectivity-limited Q-factor of approximately 105.

Capri and Riviera
10:30 a.m.–12:30 p.m.
ITuD • Finite Element and Filter Modeling
Ya Yan Lu; City Univ. of Hong Kong, Hong Kong Special Administrative Region of China, Presider

ITuD1 • 10:30 a.m. Invited
Time-Domain Beam Propagation Method Applied to Nonlinear Photonic Crystal Waveguide Devices
Masanori Koshiba; Hokkaido Univ., Japan.
A time-domain beam propagation method based on a finite element scheme is applied to characterizing nonlinear photonic crystal waveguide devices, focusing on bistable photonic crystal configurations.

ITuD2 • 11:00 a.m.
Birefringence Compensation for Planar Silica Optoelectronic Devices by Using a Layered Waveguide Core
Niranthi Somasiri, Azizur B. Rahman, Kenneth T. Grattan; City Univ., UK.
A novel method of compensating stress-induced birefringence in silica waveguides by incorporating a layered structure is numerically verified by using a computationally efficient, full-vectorial finite element-based modal solution approach.

ITuD3 • 11:15 a.m.
Comparative Assessment between Implicit and Explicit Frequency-Dependent Finite-Element Time-Domain Methods for Metallic Nanostructures Analysis
Vitaly F. Rodriguez-Esquerre[1], Masanori Koshiba[1], H. E. Hernandez-Figueroa[2]; [1]Hokkaido Univ., Japan, [2]Univ. of Campinas, Brazil.
A comparative assessment between implicit and explicit frequency-dependent time-domain algorithms based on the finite-element method for the analysis of metallic nanostructures at optical frequencies taking into account losses and dispersion is presented.

ITuD4 • 11:30 a.m.
Single-Mode Operation of Rib Waveguides
Tiparatna Wongcharoen[1], Niranthi Somasiri[2], Azizur B. Rahman[2], Kenneth T. Grattan[2]; [1]Bangkok Univ., Thailand, [2]City Univ., UK.
The upper and lower-limits for the single mode operation of rib waveguides with normalized waveguide dimensions for different values of index contrast and operational wavelength is presented by using a rigorous full-vectorial finite element method.

ITuD5 • 11:45 a.m.
Analysis of Wavelength-Selective Reflector Composed of Two Coupled Ring Resonators
Youngchul Chung[1], Doo-Gun Kim[2], Nadir Dagli[2]; [1]Kwangwoon Univ., Republic of Korea, [2]Univ. of California at Santa Barbara, USA.
A coupled-ring reflector (CRR), which is composed of two coupled rings coupled with a straight waveguide, is proposed. Its reflection property is analyzed and the design guidelines are discussed.

ITuD6 • 12:00 p.m.
Scattering Matrix Analysis for Cascaded Ring Enhanced Mach-Zehnder Interferometers
Stevanus Darmawan, Landobasa Yosef Mario Tobing, Chee Wei Lee, Shuh Ying Lee, Mee Koy Chin; Nanyang Technological Univ., Singapore.

We present a novel cascaded Ring Enhanced-Mach Zehnder Interferometer (RE-MZI), evolved from the recently developed single RE-MZI. Ultra-sharp resonance is demonstrated with restored output imbalance, allowing improved performance in sensing and all-optical switching applications.

ITuD7 • 12:15 p.m.
Novel Bandpass Filter Based on a Three-Core Photonic Crystal Fiber
Kunimasa Saitoh, Yuichiro Sato, Masanori Koshiba; Hokkaido Univ., Japan.
The wavelength-selective coupling of three-core photonic crystal fibers is investigated numerically. It is found that, with suitable choice of air-hole diameters, it is possible to obtain all-fiber bandpass filtering devices for various applications.

12:30 p.m.–2:00 p.m.
Lunch Break (On Your Own)

Sorrento and San Marino
2:00 p.m.–3:30 p.m.
ITuE • Photonic Crystals I
Michal Lipson; Cornell Univ., USA, Presider

ITuE1 • 2:00 p.m. Invited
Photonic Crystals: Controlling Spectral, Spatial and Reciprocal Properties of Light
Shanhui Fan, Mehmet Fatih Yanik, Xiaofang Yu, Jonghwa Shin, Zheng Wang; Stanford Univ., USA.
We show that photonic crystals can be used to stop, store, and time-reverse light pulses; to suppress diffraction and enable remarkable reflection properties at interfaces; and to create nonreciprocal devices that are extremely compact.

ITuE2 • 2:30 p.m. Invited
Surface Plasmon Polaritons for Nanometric Photonic Circuits
Yoshitada Katagiri[1], Hiroyuki Shinojima[1], Hiroshi Fukuda[1], Toh-ichiro Goto[1], Yoshiaki Nakano[2], Ikutaro Kobayashi[2]; [1]NTT Microsystem Integration Labs, Japan, [2]Univ. of Tokyo, Japan.
We report fundamentals of photonic devices utilizing surface plasmon polaritons bound at metal-dielectric interface, and show their usefulness in nanometric structures where ordinary optical processes in free space are avoided by quantum effects.

ITuE3 • 3:00 p.m.
Experimental Demonstration of Hybrid Lattice Photonic Crystal Directional Couplers as Wavelength Selective Filters
Chunchen Lin, Juanuze Moresraski, Dennis W. Prather; Univ. of Delaware, USA.
We demonstrate a hybrid of rectangular and triangular lattices photonic crystal directional coupler. Both the FDTD and experimental results confirmed that the dispersion properties determined this extrumely frequency sensitive device.

ITuE4 • 3:15 p.m.
Polymer-Based Photonic Crystals
Peng Yao, Caihua Chen, Shouyuan Shi, Garrett Schneider, Dennis Prather; Univ. of Delaware, USA.
We studied low index polymer photonic crystals that allow self-guided light propagation based on their engineered dispersion properties. We developed a novel and versatile fabrication approach that can fabricate three-dimensional photonic crystals using photosensitive polymers.

Capri and Riviera
2:00 p.m.–3:30 p.m.
ITuF • Multiplexing Technologies
Siegfried Janz; Natl. Res. Council Canada, Canada, Presider

ITuF1 • 2:00 p.m. Invited
Low-Loss Compact Silica-Based AWG Using Deep Ridge Waveguide

Masaki Kohtoku; NTT, Japan.
High index contrast waveguides make it possible to fabricate compact waveguide devices. However, they suffer from several problems including relatively high loss and crosstalk. Silica-based deep-ridge-waveguide technology is a promising way of overcoming these problems.

ITuF2 • 2:30 p.m.
Optical Signal Transmission with Waveguide Add-Drop Multiplexer of Free-Space Waves for Optical Interconnects
Kenji Kintaka[1], Junji Nishii[1], Atsushi Horii[2], Junpei Ohmori[2], Shogo Ura[2], Ryohei Satoh[3], Hiroshi Nishihara[3,4]; [1]Natl. Inst. of Advanced Industrial Science and Technology, Japan, [2]Kyoto Inst. of Technology, Japan, [3]Osaka Univ., Japan, [4]The Univ. of the Air, Japan.
100-Mb/s optical signals of 852 nm wavelength were transmitted for the first time through a thin-film waveguide with free-space-wave add-drop multiplexers consisting of focusing grating couplers and distributed Bragg reflectors for intra-board chip-to-chip optical interconnects.

ITuF3 • 2:45 p.m.
Design of Athermal Folded Arrayed Waveguide Grating with External Mirror
Nikolai M. Stelmakh, Michael Vasilyev; Univ. of Texas at Arlington, USA.
A folded AWG design tolerant to angular misalignments of external folding mirror is proposed. We demonstrate a hybrid implementation of athermal AWG with 10-fold reduction (~0.09 GHz/°C) of temperature shift of central wavelength.

ITuF4 • 3:00 p.m.
Simultaneous Dual Mode Add Drop Multiplexer for Optical Interconnects Buses
Maxim Y. Greenberg, Meir Orenstein; Technion, Israel.
Multimode multiplexing may replace WDM for implementing multichannel inter-chip interconnections. The performance of a novel adiabatic mode add drop multiplexer, multiplexing simultaneously 2 channels into a multimode optical bus, is analyzed based on Silicon-On-Insulator waveguides.

ITuF5 • 3:15 p.m.
Optical Frequency Comb Generation Using Dual Frequency Optical Phase Modulation
Mitsufumi Yamamoto[1], Yosuke Tanaka[1], Tatsutoshi Shioda[1], Takashi Kurokawa[1], Kaoru Higuma[2]; [1]Tokyo Univ. of Agriculture & Technology, Japan, [2]Sumitomo Osaka Cement Co. Ltd., Japan.
We have demonstrated a novel scheme of wide and flat optical comb generation by driving a phase modulator with fundamental and harmonic signals. 17 ~ 29 peaks in flat comb were experimentally obtained.

Terrazza Ballroom
3:30 p.m.–4:00 p.m.
Beverage Break and Exhibits

Capri and Riviera
4:00 p.m.–5:15 p.m.
ITuG • Photonic Crystals II
Allan Bruce; In-Plane Photonics, USA, Presider

ITuG1 • 4:00 p.m. Invited
Photonic Crystal Lasers
Sven Mahnkopf; Univ. of Wurzburg, Germany.
The integration of photonic crystal based tunable laser diodes with various other photonic crystal based devices is discussed. Examples such as the combined output from two such sources into a single output port are demonstrated.

ITuG2 • 4:30 p.m. Invited
Photonic Crystal Confined Vertical Cavity Lasers and Arrays
Kent D. Choquette, A. J. Danner, J. J. Raftery, P. O. Leisher; Univ. of Illinois, USA.
No abstract provided.

ITuG3 • 5:00 p.m.
Optical Loss Determination of Sapphire-Bonded Photonic Crystal Laser Cavities by Varying the Number of Photonic Crystal Cladding Periods
M. H. Shih, Wan Kuang, Tian Yang, Mahmood Bagheri, Zhi-Jian Wei, S. J. Choi, Ling Lu, John D. O'Brien, P. Daniel Dapkus; Univ. of Southern California, USA.
Sapphire-bonded phtonic crystal laser with varying number of photonic crystal periods were studied. The lasing threshold power increases as lattice periods decrease. The quality factor of these cavities were estimated the from lasing threshold data.

Wednesday, April 13, 2005

International Ballroom Foyer
7:00 a.m.–5:00 p.m.
Registration

St. Tropez and Monte Carlo
8:00 a.m.–10:00 a.m.
JWA • Joint IPRA/NPIS Oral Session: Frontiers in Nanophotonics
Dennis Prather; Univ. of Delaware, USA, Presider

JWA1 • 8:00 a.m. **Invited**
Recent Advances in Silicon Photonic Components
Richard Soref; AFRL, USA.
This paper will survey recent developments in Silicon-based light emitters, waveguide structures, ultrafast modulators, routers, direct-bandgap GeSn/Ge/SiGeSn/Si structures, photonic-crystal devices and subwavelength-plasmonic devices. Components can be designed for a wavelength within 0.3 to 100 μm.

JWA2 • 8:30 a.m. **Invited**
To Be Determined
Harry Atwater; Caltech, USA.
No abstract provided.

JWA3 • 9:00 a.m.
Maximal Gain and Optimal Taper Design for Raman Amplifiers in Silicon-on-Insulator Waveguides
Hagen Renner, Michael Krause, Ernst Brinkmeyer; Technische Univ. Hamburg-Harburg, Germany.
We show that free-carrier absorption puts an ultimate upper limit on the total Raman gain in silicon-on-insulator waveguides. The latter can be reached by an appropriate exponential tapering of the effective modal area.

JWA4 • 9:15 a.m.
Photonic Crystal Device Optimization Without Increasing Fabrication Tolerances: A Mode Demultiplexer Design
Yang Jiao, Shanhui Fan, David A. Miller; Stanford Univ., USA.
We present a powerful photonic crystal device optimization technique that generates robust designs without requiring precision tuning of device parameters. We optimize the performance of a compact (8.2x13.3um) waveguide mode demux with the method.

JWA5 • 9:30 a.m.
Surface Plasmon Assisted Interfacing between Nano and Micro Scale Photonic Circuits
Pavel Ginzburg, David Arbel, Meir Orenstein; Technion, Israel.
Efficient interfacing (>60% efficiency) between micro-scale waveguides and nano-scale plasmon waveguides is achieved by an ultrashort (6 microns) tapered gap plasmon waveguide. The Interplay of related plasmonic and oscillating modes is analyzed.

Terrazza Ballroom
10:00 a.m.–10:30 a.m.
Beverage Break and Exhibits

Sorrento and San Marino
10:30 a.m.–12:30 p.m.
IWA • Packaging and High-Speed Performance
To Be Determined, Presider

IWA1 • 10:30 a.m. Invited
Microwave Packaging of High-Speed Semiconductor Lasers
Ning Hua Zhu[1], Shang Jian Zhang[1], Cheng Chen[1], Yu Liu[1], Chao Liu[1], Edwin Yu Pun[2], Po-Sheun Chung[2]; [1]Inst. of Semiconductors, Chinese Acad. of Sciences, China, [2]Dept. of Electronic Engineering, City Univ. of Hong Kong, China.
Many new and different packaging types of high-speed semiconductor lasers have been developed to meet the rapidly increasing demand. This paper describes the recent progress in the microwave issues of high-speed semiconductor laser packaging.

IWA2 • 11:00 a.m.
Velocity Matching in $BaTiO_3$ Thin Film Electrooptic Waveguide Modulators
Pingsheng Tang, David J. Towner, Anthony L. Meier, Bruce W. Wessels; Northwestern Univ., USA.
Near velocity-matched coplanar strip electrodes for high-speed BaTiO3 thin film electro-optic modulators are achieved. The velocity mismatch between optical wave and microwave is 2%. Microwave loss and impedance of the electrodes are measured.

IWA3 • 11:15 a.m.
Ultrashort Polarization Converter on InP/InGaAsP Fabricated by Optical Lithography
U. Khalique[1], Y. C. Zhu[1], J. J. van der Tol[1], L. M. Augustin[1], R. Hanfoug[1], F. H. Groen[1], P. J. van Veldhoven[1], M. K. Smit[1], M. van de Moosdijk[2], W. de Laat[2], K. Simon[2]; [1]Technische Univ. Eindhoven, Netherlands, [2]ASML, Netherlands.
A compact, ultra short, integrated polarization converter has been fabricated by optical lithography. Length of converter is 125μm, and 325μm including tapers. Conversion efficiency is higher than 95% and loss is less than 1dB.

IWA4 • 11:30 a.m. Invited
Packaging of Integrated Optics Devices
Hongdu Liu; Photonic Manufacturing Service Ltd., China.
Packaging of integrated optics devices is briefly introduced, including V-grooves and fiber array fabrication, automatic optical coupling and alignment, athermal packaging design, wiring and bonding, seam sealing, reliability tests, etc. Further discussion is also included.

IWA5 • 12:00 p.m.
Fast Bend Loss Attenuator Using Carrier Injection
Sandy Ng[1], Shawkat Abdalla[1], Barry Syrett[1], Pedro Barrios[2], André Delâge[2], Ilya Golub[2], Siegfried Janz[2], Ross McKinnon[2]; [1]Carleton Univ., Canada, [2]Inst. for Microstructural Sciences, Natl. Res. Council Canada, Canada.
A compact InGaAsP/InP waveguide bend loss attenuator with electrically modulated bend loss is demonstrated. The carrier injection device exhibits better than 15 dB modulation and <20 nanosecond response time.

IWA6 • 12:15 p.m.
Real-Time Shaping of Ultra-Short Optical Pulses Using an Arrayed-Waveguide-Grating and Spatial Light Modulator
Hiroyuki Aoki[1], Koichi Aizawa[1], Tatsutoshi Shioda[1], Yosuke Tanaka[1], Takashi Kurokawa[1], Hiroyuki Tsuda[2]; [1]Tokyo Univ. of Agriculture and Technology, Japan, [2]Keio Univ., Japan.
We have demonstrated real-time shaping of a pulse waveform by means of an AWG and SLM. It was successfully demonstrated to compensate the dispersion of short pulses up to ± 3.0 ps/nm in real time.

Capri and Riviera
10:30 a.m.–12:30 p.m.
IWB • Functional Photonic Integrated Devices
Yoshiaki Nakano; Univ. of Tokyo, Japan, Presider

IWB1 • 10:30 a.m. Invited
Photonic Integrated Circuits
M. K. Smit; Eindhoven Univ. of Technology, Netherlands.
The integration scale in Photonic Integrated Circuits will be pushed to VLSI-level in the coming decade. Key technologies in semiconductor-based Photonic Integration are reviewed and the limits for reduction of device dimensions are discussed.

IWB2 • 11:00 a.m. Invited
In-P-Based Photonic Integrated Devices
Ronald Kaiser, Helmut Heidrich; Fraunhofer-Inst. für Nachrichtentechnik, Germany.
State-of-the-art as well as the current and future role of InP-based photonic integrated devices/circuits is discussed under the requirements of technological capabilities, market demands, and the presence of alternative or complementary technologies.

IWB3 • 11:30 a.m. Invited
GaInNAs SOAs for Photonic Integrated Circuits
Tsukuru Katsuyama, Jun-ichi Hashimoto, Kenji Koyama, Yukihiro Tsuji, Akira Ishida; Sumitomo Electric Industries Ltd., Japan.
GaInNAs-SOAs having simple current confinement structure have been successfully fabricated. Good temperature characteristics and large on/off ratio were obtained. Integrating these SOAs with waveguids on GaAs, optical coding operation was realized for the first time.

IWB4 • 12:00 p.m. Invited
Indium-Phosphide-Based Mutation-Designed Optical Waveguides for Application
Joseph H. Abeles, Ralph D. Whaley, Jr., Martin H. Kwakernaak, Viktor B. Khalfin, Winston K. Chan, Zane A. Shellenbarger, Allen N. Lepore, Nagendranath Maley; Sarnoff Corp., USA.
Altering morphology at scales insensible to optical waves by nanofabrication mutates optical properties of semiconductors. Low-optical-overlap modes (LOOMs) are capable of ultra-low propagation loss, nonlinearity and dispersion in high power and signal processing applications.

12:30 p.m.–2:00 p.m.
Lunch Break (On Your Own)

Sorrento and San Marino
2:00 p.m.–3:30 p.m.
IWC • FDTD, TLM and Eigenmode Expansion Methods
Azizur B. Rahman; City Univ., UK, Presider

IWC1 • 2:00 p.m. Invited
FDTD Techniques for Large-Scale Simulations: A Review on Some Recent Advances
Fernando L. Teixeira; Ohio State Univ., USA.
We review recent developments on finite-difference time-domain techniques, including: (1) Absorbing boundary conditions, (2) dispersion-relation-preserving schemes to reduce grid dispersion error, (3) subgridding techniques, and (4) unconditional stable schemes to overcome the Courant stability limit.

IWC2 • 2:30 p.m. Invited
Applications for the Unstructured Transmission Line Modeling (TLM) Method in Optoelectronics
Phillip Sewell; Univ. of Nottingham, UK.
Transmission Line modeling is a time domain simulation method suitable for integrated optics. Structured Cartesian or nonorthogonal formulations require fine meshes to avoid staircasing. Application of unstructured and frequency domain implementations for optoelectronics are discussed.

IWC3 • 3:00 p.m.
A Fourth Order Eigenmode Expansion Method for 2-D Wave-Guiding Structures
Ya Yan Lu; City Univ. of Hong Kong, Hong Kong Special Administrative Region of China.
When the eigenmode expansion method (EEM) is used in a continuously z-varying waveguide, the waveguide must be approximated by z-invariant segments. This leads to a second order error. We develop a fourth order EEM.

IWC4 • 3:15 p.m.
On the Performance of Several Time-Domain Methods: A Comparative Study
Jun Shibayama, Mitsunori Muraki, Junji Yamauchi, Hisamatsu Nakano; Hosei Univ., Japan.
The performance of the time-domain beam-propagation methods is compared with that of the finite-difference time-domain method. The computational accuracy and efficiency are investigated through the analysis of a waveguide grating.

Capri and Riviera
2:00 p.m.–3:30 p.m.
IWD • Integrated Receivers and Sensors
Joe Campbell; Univ. of Texas at Austin, USA, Presider

IWD1 • 2:00 p.m. Invited
Photonic Integrated Balanced Receivers
Andreas Umbach; u2t Photonics AG, Germany.
Abstract - A balanced photodetector and photoreceiver for applications in 40Gbit/s DPSK transmission systems are presented and their performance is compared. Cutoff-frequencies above 40GHz and -35dBm receiver sensitivity in optically amplified systems are achieved.

IWD2 • 2:30 p.m. Invited
Photonic Integrated Circuits for RF Analog Links, WDM and Other Advanced Applications
Stephen R. Forrest; Princeton Univ., USA.
We discuss recent advances in photonic integration based on asymmetric twin waveguide technology.

IWD3 • 3:00 p.m. Invited
High Sensitivity Bio-Sensor Based on an Etched Fiber Bragg Grating
Mario Dagenais, Athanasios N. Chryssis, Simarjeet S. Saini, Sang M. Lee, Hyunmin Yi, William E. Bentley; Univ. of Maryland, USA.
Sensitivity of fiber-Bragg-grating sensors to index of surrounding medium is increased by etching core of fiber. The sensor is used to detect hybridization of DNA by measuring change of index on surface of the fiber.

Terrazza Ballroom
3:30 p.m.–4:00 p.m.
Beverage Break and Exhibits

Sorrento and San Marino
4:00 p.m.–5:15 p.m.
IWE • Microcavities
To Be Determined, Presider

IWE1 • 4:00 p.m. Invited
Light in Microresonators and Chaos Theory
Evgenii Narimanov; Princeton Univ., USA.
We demonstrate that the lifetimes and emission patterns of the optical modes in microresonators are strongly affected by the phenomenona of Chaos-Assisted Tunneling and Dynamical Anderson Localization, and develop a quantitative description of these effects.

IWE2 • 4:30 p.m.
Design of Wavelength-Selective Switch Using Micro-Ring Resonators

Zhipeng Wang[1], Wei Chen[2], Zhonghua Zhu[1], Yung-Jui (Ray) Chen[1,3]; [1]Univ. of Maryland, Baltimore County, USA, [2]Little Optics Inc., USA, [3]IRTI, Taiwan Republic of China.
A very compact wavelength-selective crossbar switch array with high performances utilizing micro-ring resonators is proposed. An efficient tuning scheme to greatly improve switch unit performance is also demonstrated when fabrication errors present.

IWE3 • 4:45 p.m.
Hybrid Mach-Zehnder Racetrack Resonator for Fast, Low-Power Thermooptic Modulation and Coupling Control
William M. Green, Reginald K. Lee, Guy A. DeRose, Axel Scherer, a.m.non Yariv; Caltech, USA.
An InGaAsP/InP optical modulator based on electrical control of waveguide-resonator coupling is demonstrated. Thermooptic switching with 18.5 dB contrast, switching power of 29 mW, and 1.8 μs rise time is measured.

IWE4 • 5:00 p.m.
Dynamical Thermal Behavior and Thermal Self-Stability of Microcavities
Tal Carmon, Lan Yang, Kerry J. Vahala; Caltech, USA.
Stability and continuous operation are important for almost any use of a microcavity. We demonstrate here experimentally and theoretically self-stable equilibrium solution for a pump-microcavity system; this mechanism is governed by the thermal nonlinearity.

Sorrento and San Marino
4:00 p.m.–5:45 p.m.
IWF • Integrated Transmitters and Lockers
James Coleman; Univ. of Illinois, USA, Presider

IWF1 • 4:00 p.m. Invited
Widely Tunable Integrated DBR Laser Array
Shinji Tsuji; Hitachi Central Res. Lab, Japan.
Recent progress with short cavity distributed Bragg reflector (DBR) laser arrays is described. Quantum well insertion into a DBR enables stable, high power operation in a monolithically integrated short cavity laser array covering 1533-1568-nm wavelengths.

IWF2 • 4:30 p.m.
980 nm DBR Lasers Monolithically Integrated with EA Modulators for Optical Interconnect Applications
Gordon B. Morrison, Chad S. Wang, Erik J. Skogen, Daniel D. Lofgreen, Larry A. Coldren; Univ. of California at Santa Barbara, USA.
Short-cavity InGaAs/GaAs/AlGaAs lasers with first order DBRs and integrated EAMs were fabricated using a quantum well intermixing process. >5mW output was achieved at 45mA. DC extinction was >15dB at -1.5V with efficiencies up to 20dB/V.

IWF3 • 4:45 p.m.
Internal Wavelength Locking of Grating-Coupled Semiconductor Lasers Using Integrated On-Chip Littrow Grating
Jason K. O'Daniel, Oleg V. Smolski, Alok Mehta, Eric G. Johnson; College of Optics and Photonics/CREOL and FPCE, Univ. of Central Florida, USA.
We have conceived, fabricated, and tested a semiconductor laser with an integrated wavelength locking mechanism using an out-coupling grating combined with a total internal reflection (TIR) Littrow grating.

IWF4 • 5:00 p.m. Invited
Monolithic Integrated Tunable Transmitters
Yuliya A. Akulova, Greg A. Fish, Hong Hu, Eric Hall, Mike C. Larson, Patrick Abraham, Hugues Marchand, Chuck Turner, Chris Coldren, Eric Hegblom, Tim A. Strand, Larry A. Coldren; Agility Communications Inc., USA.
Monolithic widely-tunable transmitters are key enablers in reducing the component size, power consumption, and simplifying DWDM network provisioning. We discuss design and performance of monolithic transmitters based on SGDBR laser and electroabsorption or Mach-Zehnder modulators.

IWF5 • 5:30 p.m.
C-band Laser Wavelength Tracking Using a Dual Slab Waveguide Interferometer
David R. Cassidy, Graham H. Cross; Univ. of Durham, UK.
We report the first results of a novel III-V semiconductor dual slab waveguide interferometer operating as a wavelength tracker in the telecommunications C-band. The device demonstrates a potential sensitivity to picometer changes in laser wavelength.

Terrazza Ballroom
5:30 p.m.–7:00 p.m.
IWG • IPRA Poster Session and Exhibits

IWG1 • 5:30 p.m.
Ultrahigh-Resolution Spectroscopy Using Optical Single-Sideband Modulator and Fiber Grating Laser
Takeshi Yamamoto[1], Mitsufumi Yamamoto[1], Yosuke Tanaka[1], Tatsutoshi Shioda[1], Takashi Kurokawa[1], Kaoru Higuma[2]; [1]Tokyo Univ. of Agriculture & Technology, Japan, [2]Sumitomo Osaka Cement Ltd., Japan.
It is proposed a novel spectroscopy to make a resolution higher with an optical single-sideband (SSB) modulator. It has been experimentally cleared that the system resolution becomes higher order at ~MHz.

IWG2 • 5:30 p.m.
Pump-Probe Studies of Polarisation Effects in Semiconductor Optical Amplifiers Using a Counter-Propagation Configuration
Severine Philippe[1], Louise Bradley[1], Pascal Landais[2], Frederic Surre[2], Miguel Martinez-Rosas[3]; [1]Trinity College Dublin, Ireland, [2]Dublin City Univ., Ireland, [3]Univ. Autonoma de Baja California, Mexico.
A pump-probe experimental investigation of non-linear polarisation effects in a semiconductor optical amplifier is undertaken, in both the continuous wave and pulsed regimes.

IWG3 • 5:30 p.m.
Compact and Highly-Efficient Vertical Couplers for Active-Passive Monolithic Integration
Marko Galarza[1], Dries Van Thourhout[1], Roel Baets[1], Manuel Lopez-Amo[2]; [1]Univ. of Ghent, Belgium, [2]Univ. Publica de Navarra, Spain.
Ultra-compact low-loss vertical coupling between a 1.55 μm InGaAsP bulk active waveguide and a passive waveguide based on bimodal interference is presented. Simulation results show polarization independence and good fabrication tolerances.

IWG4 • 5:30 p.m.
Brewster Angle Based ARROW Polarizer Using High Refractive-Index Contrast Materials
Ilya Golub, Daniel Poitras, Andre Delage, Eli Simova, Pedro Barrios; Natl. Res. Council, Canada.
We report on a Brewster-angle-based ARROW polarizer in a slab waveguide formed in high index contrast thin films stack. TE to TM mode extinction ratio of 25 dB in a 2 mm-long device was measured.

IWG5 • 5:30 p.m.
Wavelength Conversion in Nonlinear Optical Polymer Waveguides
Jung Jin Ju[1], Seung Koo Park[1], Min-su Kim[1], Jeongbae Kim[1], Suntak Park[1], Myung-Hyun Lee[1], Jung Yun Do[2]; [1]Electronics and Telecommunications Res. Inst., Republic of Korea, [2]Pusan Natl. Univ., Republic of Korea.
This reports second harmonic generation and difference frequency generation in nonlinear optical polymer waveguides. The converter operates with 5.4 %W-1cm-2 SHG efficiency and -50 dB DFG efficiency at 10 mW pump power without temperature control.

IWG6 • 5:30 p.m.
Refractive Index Sensitivity and Post-Fabrication Tuning in a Long-Period Waveguide Grating
Min-Suk Kwon, Sang-Yung Shin; Korea Advanced Inst. of Science and Technology, Republic of Korea.
We investigate experimentally the refractive index sensitivity of a long-period waveguide grating made of thermo-curable polymers. Based on the refractive index sensitivity, we propose and demonstrate a simple post-fabrication tuning method using a polydimethylsiloxane block.

IWG7 • 5:30 p.m.
Fabrication and Applications of a Novel In-Plane Splitting and Coupling Device
Binglin Miao, Caihua Chen, Timothy Hodson, Shouyuan Shi, Dennis W. Prather; Univ. of Delaware, USA.
An in-plane splitting and coupling device for self-collimation photonic crystals is modeled and fabricated. The measured splitting ratio, 0.57-to-0.43, approximates the simulation result, 0.5-to-0.49. A total coupling efficiency of 86% is shown in the simulation.

IWG8 • 5:30 p.m.
Photonic Crystals with Unusual Index of Refraction as Metamaterials for an Efficient Concave Lens
Eugen Foca[1], Helmut Foell[1], Frank Daschner[1], Vladimir V. Sergentu[2], Juergen Carstensen[1], Reinhard Knoechel[1], Ion M. Tiginyanu[2]; [1]Christian-Albrechts-Univ. of Kiel, Germany, [2]Inst. of Applied Physics, Moldavian Acad. of Sciences, Republic of Moldova.
We show measurements and numerical simulations of concave lens focusing performance based on a 2D Photonic Crystal with unusual refractive index. For some frequency ranges the lens exhibit good focusing power and interesting optical behaviour.

IWG9 • 5:30 p.m.
Spatio-Temporal Hyperbolic Localization in Photonic Crystals
Davide Janner, Stefano Longhi; Politecnico di Milano, Italy.
We study analytically and numerically the behaviour of hyperbolic localization (X-waves) both in space and in space-time in photonic crystals without defects. Existence of diffractionless and dispersionless waves is demonstrated.

IWG10 • 5:30 p.m.
Novel Optical Regenerator Using Reflective Semiconductor Optical Amplifier
Taeyoung Kim, Sang-Kook Han; Yonsei Univ., Republic of Korea.
We propose and theoretically verify optical regenerator using single semi-reflective semiconductor optical amplifier. Using simplified gain model, we explaine operational principle of proposed regenerator. Simulaton result shows proposed scheme acts as 2R regenerator.

NPIS Abstracts

Wednesday, April 13, 2005

International Ballroom Foyer
7:00 a.m.–5:00 p.m.
Registration

St. Tropez and Monte Carlo
8:00 a.m.–10:00 a.m.
JWA • Joint IPRA/NPIS Oral Session: Frontiers in Nanophotonics
Dennis Prather; Univ. of Delaware, USA, Presider

JWA1 • 8:00 a.m. Invited
Recent Advances in Silicon Photonic Components
Richard Soref; AFRL, USA.
This paper will survey recent developments in Silicon-based light emitters, waveguide structures, ultrafast modulators, routers, direct-bandgap GeSn/Ge/SiGeSn/Si structures, photonic-crystal devices and subwavelength-plasmonic devices. Components can be designed for a wavelength within 0.3 to 100 μm.

JWA2 • 8:30 a.m. Invited
To Be Determined
Harry Atwater; Caltech, USA.
No abstract provided.

JWA3 • 9:00 a.m.
Maximal Gain and Optimal Taper Design for Raman Amplifiers in Silicon-on-Insulator Waveguides
Hagen Renner, Michael Krause, Ernst Brinkmeyer; Technische Univ. Hamburg-Harburg, Germany.
We show that free-carrier absorption puts an ultimate upper limit on the total Raman gain in silicon-on-insulator waveguides. The latter can be reached by an appropriate exponential tapering of the effective modal area.

JWA4 • 9:15 a.m.
Photonic Crystal Device Optimization Without Increasing Fabrication Tolerances: A Mode Demultiplexer Design
Yang Jiao, Shanhui Fan, David A. Miller; Stanford Univ., USA.
We present a powerful photonic crystal device optimization technique that generates robust designs without requiring precision tuning of device parameters. We optimize the performance of a compact (8.2x13.3um) waveguide mode demux with the method.

JWA5 • 9:30 a.m.
Paper withdrawn

JWA6 • 9:45 a.m.
Surface Plasmon Assisted Interfacing between Nano and Micro Scale Photonic Circuits
Pavel Ginzburg, David Arbel, Meir Orenstein; Technion, Israel.
Efficient interfacing (>60% efficiency) between micro-scale waveguides and nano-scale plasmon waveguides is achieved by an ultrashort (6 microns) tapered gap plasmon waveguide. The interplay of related plasmonic and oscillating modes is analyzed.

Terrazza Ballroom
10:00 a.m.–10:30 a.m.
Beverage Break and Exhibits

St. Tropez and Monte Carlo

10:30 a.m.–12:30 p.m.
NWA • Plasmonics
Shaya Y. Fainman; Univ. of California at San Diego, USA, Presider

NWA1 • 10:30 a.m.
Metawaveguide Formed by a Line of Plasmonic Nanoparticles
Sergei Tretyakov, Ari Viitanen, Constantin Simovski; Helsinki Univ. of Technology, Finland.
Propagating and leaky modes of a "waveguide" formed by a periodical array of resonant nanospheres are considered. We have found that such structures can be possibly used as nanowaveguides with sub-wavelength transverse dimensions.

NWA2 • 10:45 a.m.
Spatio-Temporal Characterization of Ultrashort Surface Plasmon Polariton Pulses Propagating in Two-Dimensional Nanohole Arrays
R. Rokitski, K. A. Tetz, Y. Fainman; Univ. of California at San Diego, USA.
We present excitation and direct imaging of femtosecond-scale surface plasmon polariton pulses, propagating along the surface of thin metallic film, perforated with a 2-D array of circular nanoholes. Temporal and spatial characterization of scattered surface fieled is performed using time-resolved spatial heterodyne detection.

NWA3 • 11:00 a.m.
Single Nanoparticle as Photonic Switch and Optical Memory Element
Bruno F. Soares, Kevin F. MacDonald, Vasilii A. Fedotov, Maxim Bashevoy, Nikolay I. Zheludev; Southampton Univ., UK.
We suggest and experimentally demonstrate a new concept for optical nanowatt switching and memory function made possible by light-induced structural transformations in a single nanoparticle

NWA4 • 11:15 a.m.
Active Plasmonics
Alexey V. Krasavin[1], Kevin F. MacDonald[1], Anatoly V. Zayats[2], Nikolay I. Zheludev[1]; [1]Univ. of Southampton, UK, [2]Queen's Univ. of Belfast, UK.
We suggest, numerically model and present initial experimental results on a new concept, based on a nanoscale structural transformation in a plasmon waveguide material, which enables optical, electronic and plasmonic modulation of surface plasmon-polariton signals.

NWA5 • 11:30 a.m.
Planar Chirality in Nanostructures: Polarization Conversion and "Focusing" of Light Propagating through Small Chiral Holes
Alexey V. Krasavin[1], Alexander S. Schwanecke[1], Yifang Chen[2], Nikolay I. Zheludev[1]; [1]EPSRC NanoPhotonics Portfolio Centre, School of Physics and Astronomy, University of Southampton, UK, [2]Rutherford Appleton Laboratory, UK.
Geometrical chirality in a planar structure leads to intriguing optical phenomena such as polarization conversion and polarization controllable "nano-focusing" for light propagating through a small chiral hole in a metallic or dielectric screen.

NWA6 • 11:45 a.m.
Biosensing Based upon Molecular Confinement in Metallic Nanocavity Arrays
Steve Blair, Yongdong Liu; Univ. of Utah, USA.
We describe the basis for a hybridization array platform in which enhanced fluorescence transduction occurs through the optical excitation of molecules located within metallic nanocavities.

NWA7 • 12:00 p.m. Invited
Negative Index Materials: New Frontiers in Optics
Costas M. Soukoulis[1], E. N. Economou[2]; [1]Iowa State Univ. and Ames Lab, USA, [2]IESL-FORTH, Greece.

Results on engineered microstructures designed to have both epsilon and mu negative will be presented. Results on microstructures operating at 100 THz and negative refraction and sub-wavelength resolution in 2D photonic crystals will be discussed.

12:30 p.m.–2:00 p.m.
Lunch Break (On Your Own)

St. Tropez and Monte Carlo
2:00 p.m.–3:30 p.m.
NWB • Silicon Nanophotonics
P. Daniel Dapkus; Univ. of Southern California, USA, Presider

NWB1 • 2:00 p.m. Invited
Novel Structures for High Confinement in Sub-Wavelength Regions
Michal Lipson, Jacob T. Robinson, Qianfan Xu, Vilson Almeida, Hod Lipson; Cornell Univ., USA.
We show high confinement in novel index nm-size waveguides and cavities. Enhancement of light by a few orders of magnitude relative to the input light is observed.

NWB2 • 2:30 p.m.
Polarization Properties of Optical Transmission of Elliptical Hole Arrays in Metal
Jill Elliott[1], Gregory Wurtz[1], Igor I. Smolyaninov[2], Nikolay I. Zheludev[3], Anatoly V. Zayats[1]; [1]The Queen's Univ. of Belfast, UK, [2]Univ. of Maryland, USA, [3]Univ. of Southampton, UK.
Optical properties of periodic arrangement of subwavelength elliptical holes in a metal film are studied. The nanostructures exhibit the enhanced broadband optical transmission which can be controlled by selecting polarization of incident and transmitted light.

NWB3 • 2:45 p.m.
Percolative Metal Nanoshells for Metallodielectric Photonic Crystals
Charles Rohde, Aiqing Chen, Keisuke Hasegawa, Miriam Deutsch; Univ. of Oregon, USA.
We present fabrication of percolative silver nanoshells on dielectric silica sphere cores, and their subsequent self-assembly into three dimensional metallodielectric photonic crystals. Results of light scattering experiments and modeling of the optical response are discussed.

NWB4 • 3:00 p.m.
Efficient Coupling between Gaussian Cavity Mode and Metal Nanoaperture
Michael Vasilyev[1], Prem Kumar[2]; [1]Univ. of Texas at Arlington, USA, [2]Northwestern Univ., USA.
Using semi-analytical approach, we demonstrate efficient coupling of light from a metal nanoaperture surrounded by periodic corrugations to the fundamental Gaussian mode of a macroscopic cavity.

NWB5 • 3:15 p.m.
Design, Fabrication and Characterization of Artificial Dielectrics for Polarization Transformations and Beam Shaping Applications
Uriel Levy, Chia Ho Tsai, Hyu Chang Kim, Lin Pang, Yeshaiahu Fainman; Univ. of California at San Diego, USA.
We report the design, fabrication and characterization of artificial dielectric components for polarization transformations and beam shaping applications. The devices are realized by deep etching of subwavelength gratings with space variant orientation into semiconductor substrate.

Terrazza Ballroom
3:30 p.m.–4:00 p.m.
Beverage Break and Exhibits

St. Tropez and Monte Carlo
4:00 p.m.–5:00 p.m.
NWC • Photonic Crystal Modalities
Michal Lipson; Cornell Univ., USA, Presider

NWC1 • 4:00 p.m. Invited
To Be Determined
Yoel Fink; MIT, USA.
No abstract provided.

NWC2 • 4:30 p.m. Invited
Semiconductor-Based Active and Passive Nanophotonics
Richard De La Rue[1], Marc Sorel[1], Nigel Johnson[1], Faiz Rahman[1], Charles Ironside[1], Lee Cronin[1], Ian Watson[2], Robert Martin[2], Chongjun Jin[1], Pierre Pottier[1], Harold Chong[1], Marco Gnan[1], Aju Jugessur[1], Edilson Camargo[1], Grant Erwin[1], Ahmad Md Zain[1], Iraklis Ntakis[1], Lois Hobbs[1], Dominique Coquillat[3]; [1]Univ. of Glasgow, UK, [2]Univ. of Strathclyde, UK, [3]Univ. de Montpellier II, France.
Nano-structured semiconductors will play a vital role in future photonics, providing efficient localised photon generation and various other functions for communications, sensing, imaging and display applications. We shall provide several illustrative examples of possibilities.

Terrazza Ballroom
5:30 p.m.–7:00 p.m.
Exhibits Open (with IPRA Poster Session)

Thursday, April 14, 2005

International Ballroom Foyer
7:30 a.m.–5:00 p.m.
Registration

Sorrento and San Marino
8:00 a.m.–10:00 a.m.
NThA • Modeling and Design for Nanophotonics
Joseph Mait; U.S. Army Res. Lab, USA, Presider

NThA1 • 8:00 a.m. Invited
To Be Determined
Steven G. Johnson; MIT, USA.
No abstract provided.

NThA2 • 8:30 a.m.
A Fabry-Perot Model for Microcavities in Two-Dimensional Photonic Crystal Slabs
Christophe Sauvan, Philippe Lalanne, Jean-Paul Hugonin; Lab Charles Fabry de l'Institut d'Optique, France.
We study light confinement in 2D Photonic Crystal microcavities with a Fabry-Perot model. We identify two mechanisms that improve the Q factor: an improved mode-profile matching at the cavity terminations and a slow wave effect.

NThA3 • 8:45 a.m.
Light-by-Light Management via Defect Mode Excitation in a Resonant Photonic Crystal
Igor V. Mel'nikov[1], J. Stewart Aitchison[1], Boris I. Mel'nikov[2]; [1]Dept. Electrical Comput Engineering, Univ. of Toronto, Canada, [2]Dept. of General Physics, M.V. Lomonosov Moscow State Univ., Russian Federation.
A selective reversable light trap is suggested for a 1D resonant photonic crystal that opens up new opportunities for signal transmission control and light localization.

NThA4 • 9:00 a.m.
Dynamic Properties of Finite Photonic Crystals with Negative Effective Band Index
Brian T. Schwartz, Rafael Piestun; Univ. of Colorado at Boulder, USA.

Photonic crystals can present a negative phase effective refractive index defined by their dispersion relation. This index predicts refraction consistent with Snell's law but not necessarily consistent with Fresnel formulae.

NThA5 • 9:15 a.m.
One-Dimensional Photonic Crystal Waveguide
Shigeo Kittaka[1], Masatoshi Nara[1], Tatsuhiro Nakazawa[1], Kazuaki Oya[1], Takahiro Asai[1], Keiji Tsunetomo[1], Junji Nishii[2]; [1]Nippon Sheet Glass Co., Ltd., Japan, [2]Natl. Inst. of Advanced Industrial Science and Technology, Japan.
Electromagnetic wave propagation in one-dimensional photonic crystal was examined. Slant incident wave couples to high order mode propagation of photonic bands on Brillouin zone boundary. The concept of one-dimensional photonic crystal waveguide was proposed.

NThA6 • 9:30 a.m.
Analysis of Polarization-Dependent Near-Field Optical Effects in Microfabricated Apertureless SNOM Probes
Wataru Nakagawa, Luciana Vaccaro, Emiliano Descrovi, Hans Peter Herzig; Inst. of Microtechnology, Univ. of Neuchatel, Switzerland.
We investigate the influence of single and multiple defects in the metal coating layer of microfabricated apertureless scanning near-field optical microscopy (SNOM) probes on the polarization-dependent emitted optical near field using rigorous electromagnetic modeling tools.

NThA7 • 9:45 a.m.
Retrieval of the Dispersive Dielectric Function of Nanoparticles Using the Maximum Entropy Method
Jarkko J. Saarinen[1], Kai-Erik Peiponen[2], Erik M. Vartiainen[3]; [1]Dept. of Physics, Univ. of Toronto, Canada, [2]Dept. of Physics, Univ. of Joensuu, Finland, [3]Dept. of Electrical Engineering, Lappeenranta Univ. of Technology, Finland.
We show that the wavelength-dependent complex dielectric function of spherical nanoparticles embedded in water matrix can be obtained using the maximum entropy method along with surface plasmon resonance spectroscopy.

Terrazza Ballroom
10:00 a.m.–10:30 a.m.
Beverage Break and Exhibits

Sorrento and San Marino
10:30 a.m.–12:00 p.m.
NThB • Photonic Crystal Devices
To Be Determined, Presider

NThB1 • 10:30 a.m. Invited
Photonic Nanostructures and Devices Based on Photonic Crystals
Susumu Noda; Kyoto Univ., Japan.
Photonic crystals, in which the refractive index changes periodically, provide an exciting new tool for the manipulation of photons and have received keen interest from a variety of fields. In this talk, I will review the recent progresses and future prospects of photonic crystals and their applications to photonic nanostructure devices.

NThB2 • 11:00 a.m.
Novel In-Plane Splitting and Coupling Devices
Binglin Miao, Caihua Chen, Timothy Hodson, Shouyuan Shi, Dennis Prather; Univ. of Delaware, USA.
A novel in-plane splitting and coupling device for self-collimation photonic crystals is proposed, modeled, and fabricated. A measured splitting ratio of 0.57-to-0.43 is compared to simulation results of 0.51-to-0.49.

NThB3 • 11:15 a.m.

Bloch Modes Coupling in Photonic Crystal Waveguides
Benoit Cluzel[1], Emmanuel Picard[1], Thomas Charvolin[1], Emmanuel Hadji[1], Davy Gérard[2], Frédérique de Fornel[2]; [1]CEA Grenoble, France, [2]CNRS, France.
We investigate the properties of Bloch modes inside a photonic crystal waveguide. By using simultaneously a near field optical microscope and a transmittance setup, we demonstrate that Bloch modes having different parity are coupled.

NThB4 • 11:30 a.m.
Tunable Microcavities in Two Dimensional Photonic Crystal Waveguides
Iwan Märki[1], Martin Salt[1], Hans Peter Herzig[1], Ross Stanley[2]; [1]Inst. of Microtechnology, Switzerland, [2]Swiss Ctr. of Electronics and Microtechnology (CSEM), Switzerland.
We discuss the in-plane transmission properties of actuated resonant cavities inside photonic crystal waveguides. Using theoretical and experimental results, different methods of field perturbation that allow tuning and damping of the in-plane transmission are presented.

NThB5 • 11:45 a.m.
Influence of High Refractive Index Substrates on High-Q 2-D Photonic Crystal Slab Cavities
Liang Chen, Elias Towe; Carnegie Mellon Univ., USA.
When a substrate is close to an air-bridge or a low-index cladding type PhC slab, the Q dramatically drops. The increased loss is attributed to the coupling of the slab modes to the substrate modes.

12:30 p.m.–2:00 p.m.
Lunch Break (On Your Own)

Sorrento and San Marino
2:00 p.m.–3:30 p.m.
NThC • Photonic Crystal Integration Platform
Nikolay Zheludev; Univ. of Southampton, UK, Presider

NThC1 • 2:00 p.m. Invited
Integration of Functional Optical Devices Using Photonic Crystals
Axel Scherer; Caltech, USA.
No abstract provided.

NThC2 • 2:30 p.m.
Investigation of the Spectral Characteristics of Photonic Crystal Waveguides with Heterodyne Scanning Near-Field Optical Microscopy
Pierpasquale Tortora[1], Maxim Abashin[2], Iwan Marki[1], Wataru Nakagawa[1], Luciana Vaccaro[1], Martin Salt[1], Hans Peter Herzig[1], Uriel Levy[2], Yeshaiahu Fainman[2]; [1]Inst. of Microtechnology, Univ. of Neuchatel, Switzerland, [2]Univ. of California at San Diego, USA.
We experimentally measure the amplitude and phase of light propagating inside a Silicon photonic crystal waveguide using a heterodyne scanning near-field optical microscope, and find agreement between near-field and far-field measurements of spectral characteristics.

NThC3 • 2:45 p.m.
Three-Dimensional Photonic Crystals in GaAs Through Selective Growth, Etching and Oxidation
Janusz Murakowski, Chris Schuetz, Garrett J. Schneider, Dennis Prather; Univ. of Delaware, USA.
We present an efficient method for the fabrication of three-dimensional photonic crystals in GaAs-based materials that exploits the dependence of the oxidation rate of AlGaAs on the aluminum content in the alloy.

NThC4 • 3:00 p.m.
Photonic Crystal Microcavities as Ultracompact Film-Thickness Monitors for Biosensing
Geoffrey W. Burr[1], Edmond Chow[2], Laura W. Mirkarimi[2], Mihail Sigalas[2], Annette Grot[2]; [1]IBM Almaden Res. Ctr., USA, [2]Agilent Technologies, Inc., USA.

We experimentally demonstrate single-monolayer sensitivity in a two-dimensional photonic crystal microcavity, for film-thickness biosensing. 3-D FDTD simulations are used to optimize for large wavelength shifts even when bio-material coats only a portion of the device.

NThC5 • 3:15 p.m.
Density of States Enhanced Scattering Efficiency from Silicon Nanocrystal Doped Ultra-High-Q Microcavities.
Tobias J. Kippenberg[1], Anna Tschebotareva[2], Jeroen Kalkman[2], Albert Polman[2], Kerry J. Vahala[1]; [1]Caltech, USA, [2]F.O.M. Inst. for Atomic and Molecular Physics, The Netherlands.
Scattering induced by nano-particles in a microcavity is investigated for the case of silicon nanocrystal doped microtoroids and a significant enhancement of scattering into the originally doubly-degenerate cavity eigenmodes is found, exceeding >99.42%.

Terrazza Ballroom
3:30 p.m.–4:00 p.m.
Beverage Break and Exhibits

Sorrento and San Marino
4:00 p.m.–5:15 p.m.
NThD • Nanophotonic Fibers
Vladimir M. Shalaev; Purdue Univ., USA, Presider

NThD1 • 4:00 p.m. Invited
To Be Determined
Benjamin J. Eggleton; Univ. of Sydney, Australia.
No abstract provided.

NThD2 • 4:30 p.m. Invited
Novel Nonlinear Interactions in Photonic Crystal Fibers
Alexander Gaeta; Cornell Univ., USA.
No abstract provided.

NThD3 • 5:00 p.m.
3D Fabrication of Photonic Structures Embedded in Dielectric Materials
Wenjian Cai, Rafael Piestun; Univ. of Colorado at Boulder, USA.
We report the fabrication of three-dimensional computer-generated holograms and optical waveguides embedded in glass using amplified and unamplified femtosecond laser pulses.

Friday, April 15, 2005

International Ballroom Foyer
7:30 a.m.–12:00 p.m.
Registration

Sorrento and San Marino
8:00 a.m.–10:00 a.m.
NFA • Frontiers in Quantum Nanophotonics I
To Be Determined, Presider

NFA1 • 8:00 a.m.
Molecular Scale Photochemical Reaction Control on Surface Using Triplet-Sensitizer SPM Probes
Akira Otomo, Hideki Miki, Isao Aoki, Shinro Mashiko; Natl. Inst. of Information and Communications Technology, Japan.

We study feasibility of photochemical reaction on substrate surface using a triplet sensitizer probe. Efficient triplet energy transfer from a sensitizer molecule on substrate surface dimerized a quarter of cinnamoyl groups on another substrate surface.

NFA2 • 8:15 a.m.
Controlling Synthesis of Nanostructured Silver Aggregates by Light
Alexander K. Popov, J. Brummer, R. Langlois, M. Loth, R. Schmitz, G. Taft, R. Tanke, A. Wruck; Depts. of Chemistry, Physics & Astronomy, and Biology, Univ. of Wisconsin at Stevens Point, USA.
The possibilities for control over the size and properties of silver nanoaggregates with incoherent and laser light are investigated. The applications in nanoengineering and for giant enhancement of optical processes at nanoscale are discussed.

NFA3 • 8:30 a.m. Invited
Strong Coupling between a Single Quantum Dot and a Photonic Crystal Slab Nanocavity
Hyatt M. Gibbs; Univ. of Arizona, USA.
Vacuum Rabi splitting and a temperature-scanned anti-crossing curve have been seen in the photoluminescence from a single InAs quantum dot transition strongly coupled to a single mode of a photonic-crystal-slab nanocavity.

NFA4 • 9:00 a.m.
Plasmon Enhanced Optical Near-Feld in Metal-Nano-Aperture VCSEL with Tight Transverse Mode Confinement
Jiro Hashizume, Fumio Koyama; Microsystem Res. Ctr., P & I Lab, Tokyo Inst. of Technology, Japan.
We achieve a record-high optical near-field power-density of over 1 MW/cm2 in metal nano-aperture VCSELs with reducing the mode-volume in a small oxide aperture. Also, we demonstrate transverse-mode control with loading a patterned metal reflector.

NFA5 • 9:15 a.m. Invited
Compound Semiconductor Nanowires as Building Blocks for Nanophotonics
Deli Wang; Univ. of California, San Diego, USA.
Semiconductor nanowires and nanowire heterostructures are attractive and versatile building blocks to assemble active photonic devices, such as light-emitting diodes, lasers and photodetectors, which enables an unconventional approach for integration on a single chip.

NFA6 • 9:45 a.m.
3D Optical Memory by Photoluminescence Change in Sm-Doped Sodium Borate Glass
Myeongkyu Lee[1], Jinhyong Lim[1], Eunkyoung Kim[1], Sunkyun Lee[2], Kisoo Lim[2]; [1]Yonsei Univ., Republic of Korea, [2]Chungbuk Univ., Republic of Korea.
We observed femtosecond laser-induced photoluminescence (PL) change in Sm-doped sodium-borate glass. Recording and readout of the multi-layer dot patterns by use of this spectral change are here discussed

International Ballroom Foyer
10:00 a.m.–10:30 a.m.
Beverage Break

Sorrento and San Marino
10:30 a.m.–11:30 a.m.
NFB • Frontiers in Quantum Nanophotonics II
To Be Determined, Presider

NFB1 • 10:30 a.m.
Nano-Optical Bar-Code Tagging for Biological and Chemical Applications
Gerasim S. Galitonov[1], Hywel Morgan[2], Nikolay I. Zheludev[1]; [1]NanoPhotonics Portfolio Ctr., School of Physics and Astronomy, Univ. of Southampton, UK, [2]School of Electronics and Computer Science, Univ. of Southampton, UK.

Abstract is unavailable.

NFB2 • 10:45 a.m.
Fourier Analysis of Essential Transmission via Cylindrical Plasma Polariton Propagation in Periodic Nanoholes
Quirino Balzano, Yu-Ju Hung, Igor I. Smolyanivov, Christopher C. Davis; Computer and Electrical Engineering Dept., Univ. of Maryland at College Park, USA.
Fourier expansions are used to express the fields radiated from a thin gold film with periodic nanoholes. The polariton fields inside the nanoholes are analyzed. The optical transmission is calculated by imposing field boundary conditions.

NFB3 • 11:00 a.m.
Quantum Controlled Optical Memory Based on Slow-Light Induced Stationary Lights
Byoung S. Ham; Inha Univ., Republic of Korea.
Using two color standing lights a dynamic quantum control of optical memory is presented. This optical memory technique is based on resonant Raman field induced phase gratings, which propagate slowly owing to slow light phenomenon.

NFB4 • 11:15 a.m.
Effect of Heat Treatment on Optical Characteristics of Highly Nonlinear Optical Fiber Doped with PbTe Semiconductor Quantum Dots
Seongmin Ju[1], Pramod R. Watekar[1], Chuljin Kim[2], Won-Taek Han[1]; [1]Gwangju Inst. of Science and Technology, Republic of Korea, [2]Gyeongsang Natl. Univ., Republic of Korea.
The effect of heat treatment of highly nonlinear optical fiber doped with the PbTe nanoparticles on absorption characteristics was investigated. The excitonic absorption peaks near 687 and 1055nm were found linearly red-shifted with temperature.