Integration of a CMOS compatible electrically pumped InP based micro laser

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In order to provide an efficient optical link for future optical interconnects, a key issue is to fabricate a micro laser coupled to a Si waveguide.

Micro disk and Photonic Cristals based lasers mix low space dimensions (Fig 1.) low threshold and low power consumption which are critical parameters to introduce optical functionalities. Main difficulties concern contacting, controlling the radiative recombinations inside the PC structures and coupliong into waveguides.

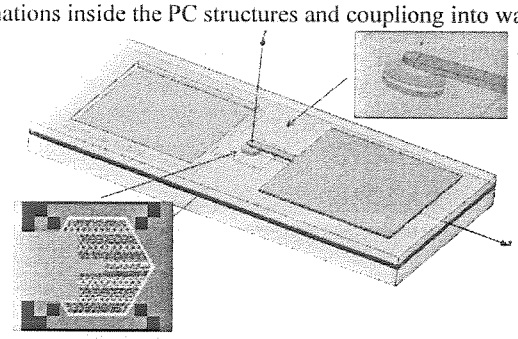

Fig 1. A 300 x 150 µm structure with a WGM micro disk and details of a H5 PC

The active membrane grown by Solid Source Molecular Beam Epitaxy (SSMBE) on an InP wafer is separated into dies and bonded on a SOI or a silicon 200 mm wafer. This membrane contains 3 InAsP based quantum wells emitting at 1.55 µm, a n+ top contact, and a bottom tunnel junction for the p contact. SOI wafer is used for bottom waveguides, but low cost solutions using amorphous silicon are also developed, in compliance to the CMOS standards.

The first experimental results (Fig 2.) show that thresholds at room temperature of the electrically driven microdisk lasers corresponds to 6.5 kA/cm². The coupling of such microlasers into a submicron Si waveguide will be exposed.

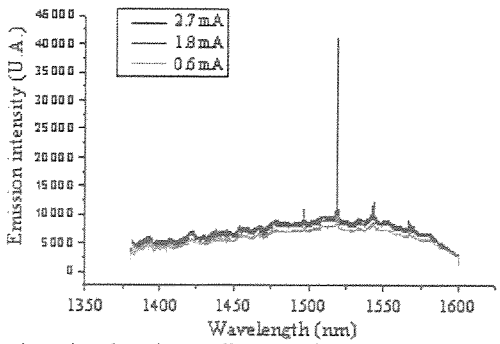

Fig 2. Spectral results of an electrically pumped micro disk at room temperature

Applications of Photonic Integration

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Poster Session 1

1. **Luc Augustin:** Integrated 2x2 polarization splitter/converter on InP/InGaAsP
2. **Yohan Barbarin:** High Power Electrically Pumped Modelocked VECSEL
3. **Aude-Reine Bellancourt:** First Demonstration of a Modelocked Integrated External-Cavity Surface Emitting Laser (MIXSEL)
4. **Robert Bellini:** Soft-matter photonics on anisotropically etched silicon
5. **Krister Bergenek:** Enhanced Light Extraction from AlGaInP LEDs with a Shallow 2D Photonic Crystal
6. **Audrey Berrier:** Impact of the feature size on the optical properties of photonic crystal devices
7. **Pietro Binetti:** Membrane couplers and photodetectors for optical interconnections on CMOS ICs
8. **Jonathan Bradley:** Al2O3 and Y2O3 Waveguides as Building Blocks for Active Integrated Photonic Devices
9. **Mike Bülters:** A Vertical Electroabsorption Transceiver Consisting of Multiple Heterostructures
10. **Marek Chacinski:** Evaluation of low cost mounting techniques for high speed multi-electrode lasers
11. **Shahina Mumthaz Chakkalakkal Abdulla:** Tuning of Photonic Band Gap Crystals by NOEMS Actuators
12. **Wout De Cort:** A silicon laser with gain in doped liquid crystal
13. **Peter Debackere:** Surface Plasmon Interferemeter:Fabrication and Measurement
14. **Boudewijn Docter:** Deep etched DBR mirrors for compact integrated lasers
15. **Jose David Domenech Gomez:** Analysis of non-uniform integrated optics Bragg gratings using GNU/GPL MEEP FDTD
16. **Rafal Dylewicz:** Inductively coupled plasma etching of GaN using SiCl4/Cl2/Ar for submicron-sized features fabrication
17. **Stephen Elsmere:** Fiber Amplification of VECSEL seed pulses
18. **Dimitri Geskus:** Fabrication of optical active devices in KYW:Yb
19. **Oliver Hadeler:** Liquid Crystals for Photonics Applications
20. **Lina Huang:** Statistical study of optical trapping efficiency
21. **Koen Huybrechts:** All-Optical Flip-Flop Operation using an AR-coated Distributed Feedback Laser Diode
22. **Olena Ivanova:** Variational effective index mode solver
23. **Roman Kappeler:** Simulations on Contacting Schemes for Active Photonic Crystals (PhC)
24. **Peter Kaspar:** Electrical Contacts on Active Photonic Crystal Structures
25. **Edwin Klein:** Reconfigurable Optical Router based on vertically coupled thermally tunable Si3N4/SiO2 microring resonators
26. **Abigaël Kok:** Modeling of efficient coupling structures for integration of pillar photonic crystal waveguides with ridge waveguides
27. **Christian Koos:** Ideal Contour Trajectories for Low-Loss Waveguide Bends
28. **Antonio La Porta:** Design of an integrated multiwavelength laser with RF optical modulator for burst-mode transmitters in packet-switching based metropolitan area networks
29. **Maria Latorre:** Bathymetry Analysis by Lidar Signal
30. **Tomas Lauerman:** Modeling of nonlinear propagation in a microring resonator
31. **Szymon Lis:** SiO2 – TiO2 Thin Film for Integrated Optics Fabricated by theSol-Gel Technique
32. **Ping Ma:** Design, Fabrication and Characterization of Photonic Crystal Slab Waveguides for TM-Polarized Light
33. **Deran Maas:** First Demonstration of a Modelocked Integrated External-Cavity Surface Emitting Laser (MIXSEL)
34. **Antonio Malacarne:** An optical Flip-Flop Based on Erbium-Ytterbium Doped Fibre
35. **Fabien Mandorlo:** Integration of a CMOS compatible electrically pumped InP based micro laser
36. **Milan Marell:** Non-linear behavior in quantum-well polarization converters

Poster Session 2

37. **Ahmad Rifqi Md Zain:** Tapered Periodic Photonic Crystal (PhC) micro-cavity filters embedded in a ridge waveguides
38. **Gabor Mezosi:** Semiconductor Ring Laser Bistables
39. **Pascual Munoz:** Design of Multiwavelength Arrayed Waveguide Sagnac Interferometer-based Terahertz Optical Add Drop multiplexers
40. **Paolo Navaretti:** 1.3 um all-GaInNAs modelocked VECSEL
41. **Patrick Nedel:** Fabrication of Photonic Quantum Information Devices based on InAs Quantum Dots and GaAs Photonic Crystals
42. **Guido Piaszenski:** 3D pattern definition via UV-Nanoimprint Lithography
43. **Roberto Proietti:** Unrepeatered 16x10 Gb/s DPSK transmission over 140 km single-mode fiber by means of two commercial SOAs
44. **Antonio Qualtieri:** Colloidal nanocrystals air bridge fabricated by direct lithography
45. **Adrian Quarterman:** Active stabilisation of VECSEL sources
46. **Roxana Ileana Rebigan:**
47. **Lars Rindorf:** Integrated photonic crystal fibers for biosensing and photonic components
48. **Gunther Roelkens:** A die-to-wafer bonding approach to photonics integration
49. **Richard Royce:** Lasing characteristics and physical properties of 1.3μm emitting modulation doped quantum dot lasers.
50. **Benjamin Rudin:** First Demonstration of a Modelocked Integrated Absorber External-Cavity Surface Emitting Laser (MIXSEL)
51. **Jonathan Schrauwen:** Focused ion beam fabrication of photonic structures in silicon-on-insulator
52. **Ekber Selcuk:** Guided self-organized anisotropic strain engineering through step engineering on shallow-patterned substrates for complex quantum dot ordering
53. **Yaocheng Shi:** Carrier lifetimes in dry-etched InP-based photonic crystals
54. **Joanna Skiba-Szymanska:** Record high nuclear magnetic field in a 40 nm InP quantum dot
55. **Nut Sritirawisarn:** Surface morphology induced InAs quantum dash-dot shape transition on InGaAsP/InP (100)
56. **Tiziana Stomeo:** Integrated Photonic Crystal devices in InP-membrane for metropolitan optical networks
57. **Patric Strasser:** Photonic crystal etching process characterization: Losses, carrier lifetime and surface roughness
58. **Mikael Svalgaard:** High precision AFM characterization of planar photonic crystals
59. **Dominik Szymanski:** Ultrafast all optical switching using photonic crystals integrated into a Mach Zehnder interferometer
60. **George The:** Single-photon detectors for multiple-photon number resolution and other applications
61. **Ruth Thompson:** Ultra-Compact Integrated Interferometeric Devices for Pulse Regeneration
62. **Mark Thompson:** Pulse Generation in Quantum Dot Laser Diodes
63. **Frederik Van Laere:** Polarization diversity and wavelength monitoring in BCB-bonded InP-membranes.
64. **Wouter Van Parys:** Transparent amplifying waveguide optical isolator
65. **Kristof Vandoorne:** A Photonic Implementation of Reservoir Computing
66. **Yongqiang Wei:** 10 Gb/s modulation of 1.3 um GaInNAs lasers up to 110 °C
67. **Christopher Wiesmann:** Altering the Radiation Pattern of Light Emitting Diodes by 2D Photonic Crystals
68. **Georg Winzer:** Low birefringence Mach-Zehnder-Delay Interferometer on Silicon-on-Insulator (SOI) substrates
69. **Ling XU:** A reflective transceiver at 1.55 um for the access network
70. **Jing Yang:** Judd-Ofelt Analysis of Nd(TTA)3Phen-doped 6-FDA/Epoxy Planar Waveguides
71. **Hua Zhang:** Fabrication, Electrical and Optical Characterisation of Terahertz Microdisk Quantum Cascade Lasers
72. **D Zhou:** Position and Number Control of InAs Quantum Dots Grown on Truncated InP Pyramids by SA MOVPE