

Coupling to fibre remains a severe issue in optical communication networks. The ongoing trend to make components smaller in order to integrate them on one chip, makes the problem even more difficult. The large difference in dimensions between fibre and waveguides on chip, causes high insertion losses and high packaging cost. Grating couplers are a very attractive solution, since they open the prospect of wafer-scale testing. Light is coupled out-of-plane from fibre to waveguide, so in- and outcoupling can occur everywhere on the chip.

In this poster, we present theoretical and experimental results of two different types of compact ($10 \times 10 \mu\text{m}^2$) grating couplers in InP, based on different technologies. The first type is made in classical InP-heterostructure (low vertical index contrast) and based on angled CAIBE-etching. The theoretical coupling efficiency to fibre is over 50%. Integration with active components (e.g. lasers) is straightforward. The latter type of coupler is made in InP-membrane (high vertical index contrast), based on BCB waferbonding technology. The most complex design has a theoretical coupling efficiency over 90%. We have measured 30% coupling efficiency on first fabricated simple structures. A scheme for integrating InP-membrane components with active “classical InP-heterostructure” components will be provided.

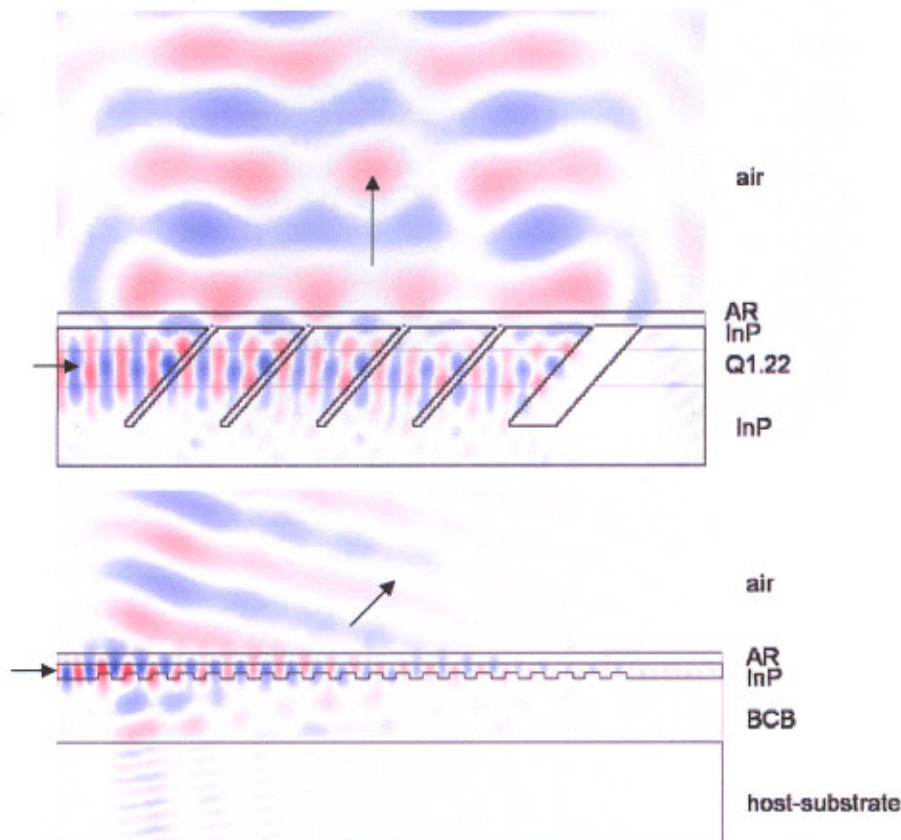


Fig1. Two types of compact fibre-couplers. At the top: InP-heterostructure coupler based on angled CAIBE-etching. Below: InP-membrane coupler based on BCB waferbonding technology.

Poster Session I

Optical Studies and Devices

Lydie Ferrier: Multilayer photonic micro-nano structures with high index contrast for the 3D control of light (p26)

Fabrice Raineri: Ultrafast optical bistability in an InP-based twodimensional photonic crystal (p27)

Gabriele Vecchi: photonic crystals and optical waveguide devices (study of nonlinear behavior) (p28)

Nadia Belabas Plougonven: Four-wave mixing in photonic crystals (p29)

Luc Augustin: Design and fabrication of a single etch-step polarization splitter on InP/InGaAsP with increased width tolerance (p30)

Martijn Heck: Tunable Integrated Pulse Shaping Devices (p31)

Milan Marell: 2R regenerator within the polarization based integration scheme (POLIS) (p32)

Pietro Binetti: A compact detector for use in photonic interconnections on CMOS ICs (p33)

Glen Stark: 2D FDTD Photonic Crystal Device Simulation and Characterization (p34)

Patric Strasser: Photonic crystal device fabrication in a low-index vertical guiding regime (p35)

Ping Ma: Investigation of realistic photonic bandgaps for TM-polarized light for all-optical switching (p36)

Robert Wueest: Optical near-field investigations of planar photonic crystal structures: waveguides and waveguide transitions. (p37)

Yuriy Fedoryshyn: Investigation of Short Carrier Lifetimes in Low Temperature Grown InGaAs/InAlAs Quantum Well Structures for All-Optical Switches (p38)

Sushil Mujumdar: SNOM studies of resonant nanocavities in multistep photonic crystal heterostructures. (p39)

Benjamin Rudin: High-Performance Mode-Locking with up to 50 GHz Repetition Rate from Integrable VECSELs (p40)

Markus Beck: ZnO overlayers for the generation of strong acoustic fields on arbitrary substrates (p41)

Odilon Couto: Manipulation of polarized photons using acoustic transport in (110) GaAs quantum wells (p42)

Pierre Pottier: Photonic crystal beamsplitters on ridge waveguides (p43)

Marco Francardi: Quantum dot photonic crystal microcavities at 1300 nm (p44)

- Frederik Van Laere:** compact grating couplers in InP, (p45)
- Jana Jagerska:** High Concentration Er³⁺/Yb³⁺ Co-doped Waveguide Amplifier (p46)
- Alejandro Yacomotti:** All optical bistable slow Bloch modes in a two-dimensional photonic crystal (p47)
- Benjamin Gesemann:** Selective thermal emitters in 2D-photonic crystals (p48)
- Julien Poette:** Sensitive measurement technique of Relative Intensity Noise (p49)
- Maria Dienerowitz:** Interaction of Subwavelength Metal Nanostructures with Light (p50)
- Matteo Burresti:** Local investigation of light in photonic quasi-crystal structures (p51)
- Rob Marchington:** Integrated Optical Traps in Optoelectronic Circuits for Microfluidic Applications (p52)
- Christopher Reardon:** Greyscale lithography in order to fabricate Diffractive Optic Elements (p53)
- David O'Brien:** Quantum Dots in Photonic Cristal NanoCavities (p54)
- Douglas McRobbie:** Investigation of transition dynamics in a quantum-dot laser optically pumped by femtosecond pulses. (p55)
- Zakaria Mihoubi:** Vertical-external-cavity surface-emitting lasers (VECSELs) (p56)
- René de Ridder:** Characterisation of Slow Light in a Si₃N₄ Waveguide Grating (p57)
- Ronald Dekker:** Self Phase Modulation and Broadband Raman Gain in Silicon-on-Insulator Waveguides. (p58)



ePIXnet Winter School

**Optoelectronic Integration
~ Technology and Applications ~**



**12-17 March 2006
Pontresina (CH)
www.ePIXnet.org**