Abstract

Focused ion beam is a direct-write technique to make sub-micrometer structures in various materials. A finely focused beam (spotsize < 10nm) of Ga^+ ions in accelerated onto the target material, where it sputters atoms, implants Ga^+ ions, and damages the structure of the target material. Our goal is to make this technique into a versatile way of making sub-micrometer structures for photonic applications.
One of the problems is the Gaussian profile of the focalized ion beam, because it makes it impossible to etch vertical sidewalls in a direct process. We have successfully addressed this problem in InP by utilizing an Al_2O_3 hard mask, and demonstrated the fabrication of DBR mirrors and disk lasers with a two step etching process (see Figure). The etch process we use can generate nearly vertical sidewalls and high aspect ratio slits. The problem with the structures however, is the large optical losses generated by the ion implantation and crystal damage. We have found comparable high losses in shallowly etched gratings in SOI waveguides. We are currently looking into these problems.

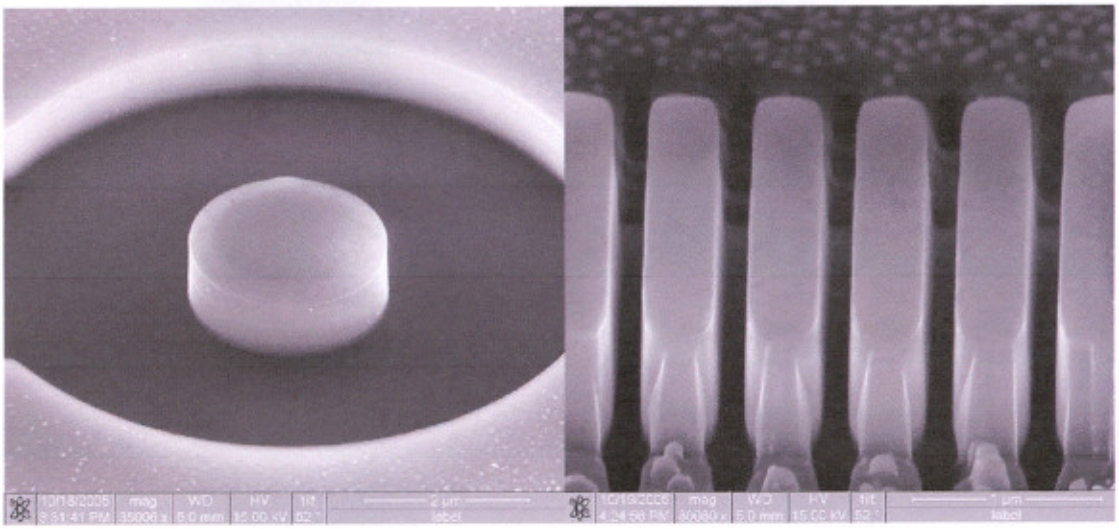

Figure: A ring resonator with diameter 2 microns in InP membrane on Silica, and a DBR mirror with slits < 200nm in an InP ridge waveguide. The problem with both structures is the large optical losses.

Poster Session II
Modelling and Photonic circuits

Omer Khayam: Design and optical properties of photonic crystals

Ko-Hsin Lee: Two-dimensional Photonic Crystals reduced features on InP-based materials etched using Cl2/Ar Inductive Coupled Plasma (p61)

Harm Kicken: In¯ltration of two-dimensional semi-conductor photonic crystals: methods and goals (p62)

Els Kok: Photonic crystals of InP-based rods (p63)

Jan Hendrik den Besten : 4×80 Gbit/s wavelength conversion using integrated SOAs and AWG (p64)

Ling XU: Modeling and design of a high-speed reflective transceiver for the access network (p66)

Rabah Hanfoug: Optimized design to reduce reflection in Multimode interference coupler (p68)

Peter Cristea (see Y Fedoryshyn)

Aude-Reine Bellancourt: Design, characterization and fabrication of VECSELs (p69)

Deran Maas: Simulations of Thermal Lensing in a Passively Mode-Locked Surface-Emitting Semiconductor Laser (p70)

Marco Gnan: Photonic Wire Bragg Gratings in Silicon on Insulator (p71)

Steven McMaster: Realisation of OCMDA encoding/decoding using InGaAs/InAlGaAs monolitically integrated Mach-Zehnder Interferometer Devices (p72)

Jonathan Schrauwen: Focused ion beam (p73)

Joost Brouckaert: integrated wavelength demultiplexer. (p74)

Joris Roels: Nanophotonic NEMS modulators in Silicon-on-insulator (p75)

Katrien De Vos: Label-free optical biosensor based on active and passive resonant cavities. (p76)

Tomas Lauerman: Modelling of Microresonator Based Waveguide Structures (p77)

Ziyang Zhang: Vertically Coupled Photonic Crystal Filters: Numerical Simulation and Nano-Fabrication (p78)

Amélie Têtu: Optimization of Photonic Crystal Waveguides 60° Bends in the Slow Light Regime for Broadband Transmission (p79)

Antti Säynätjoki: Characterization of photonic crystals

Michael Strain: Integrated Chirped Bragg Gratings for Dispersion Compensation (p80)

Rob van Loon: Silicon Nanocrystals and Surface Plasmons (p81)

Stephen Hegarty: Quantum-dot Phase modulator operating at 1300 nm (p82)

ePIXnet Winter School

Optoelectronic Integration
~ Technology and Applications ~

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