Q 43: Laseranwendungen und Photonik 2

Time: Wednesday 16:30–17:30 Location: SCH A118

Q 43.1 Wed 16:30 SCH A118

Photonic Crystal Halfhole-Microresonators on (220x450) nm SOI waveguides — •Bülent A. Franke[1], Aws Al-Saadi[1], Miroslaw Szczambura[1], Sebastian Kupijai[1], Shaimaa Mahdi[1], Viachaslau Ksiandzou[2], Sigurd Schrader[2], Hans J. Eichler[1], and Stefan Meister[1] — [1]Technische Universität Berlin, Institut für Optik und Atomare Physik, Berlin, Germany — [2]Technische Fachhochschule Wildau, Institut für Plasma- und Lasertechnik, Wildau, Germany

1D-photonic crystal halfhole Fabry-Pérot resonator based on Silicon-on-Insulator technology (SOI) will be presented. The microresonators in SOI waveguides are created by sinusoidal modulation of the waveguide width to realize Bragg mirror sections. The mirror regions are separated by a sub-micron spacer. The microresonators are manufactured by DUV-Lithography (248 nm) in a CMOS environment with 130 nm resolution. The waveguides as well as the width modulated mirror regions are designed using a single mask and are fabricated in a shallow trench process. Filters with different halfhole diameters, cavity length, and mirror refectivity was produced and investigated. Q-factors of up to 1500 could be observed around 1550 nm wavelength with an insertion loss of 3 dB. The results will be discussed and compared and simulated.

Q 43.2 Wed 16:45 SCH A118

Single optical microfibre interferometer — •Konstantin Karapetyan, Wolfgang Alt, Fabian Bruse, and Dieter Meschede — Institut für Angewandte Physik, Universität Bonn, Wegelerstr. 8, 53115, Bonn, Germany

Applications of optical microfibres (OMF)—optical fibres with a diameter on the order of 100...1000 nm operating in the strong guiding regime—have been proposed for evanescent field spectroscopy, atom trapping, nonlinear optics, and microparticle manipulation. Interferometers with an OMF in one or both arms have also been demonstrated. We present a single OMF-based interferometer. This device uses the down-taper of an OMF as a beam splitter and the up-taper as a beam recombiner, similar to a Mach-Zehnder interferometer. The two arms are realized here by the two lowest circular modes of the OMF, having different propagation constants. Due to their different mode field diameters, they experience specific absorptive and dispersive changes from materials in the evanescent field. We explain the design and manufacturing of such devices and show how they can be applied to a variety of experiments including the sensing of temperature, pressure and stretching, simultaneous measurement of absorption and dispersion of liquids, adsorbed and dissolved molecules, and free atoms.

Q 43.3 Wed 17:00 SCH A118

Applications of selectively liquid-filled photonic crystal fibers — •Timo Gissibl, Marius Vieweg, and Harald Giessen — 4th Physics Institute, University of Stuttgart, Pfaffenwaldring 57, 70569 Stuttgart, Germany

Photonic crystal fibers have been the subject of many research efforts due to their amazing characteristics, such as endless single-mode propagation, high nonlinearity, tunable dispersion, or high birefringence. We developed a unique technique to infiltrate liquids, metals, nanodiamonds, or gases into selected holes of photonic crystal fibers. Two-photon polymerization is used to selectively close the holes of such a fiber [1]. With this method we have the possibility to close microstructured fibers with any desired pattern and produce in this way tunable liquid-filled photonic crystal fibers for light propagation in two-dimensional discrete systems. As examples we show 19-strand large-mode-area liquid-filled fibers, as well as tunable highly-birefringent liquid-filled photonic crystal fibers.

[1] M. Vieweg, T. Gissibl, S. Pricking, B. T. Kuhlmey, D. C. Wu, B. J. Eggleton, and H. Giessen, "Ultrafast nonlinear optofluidics in selectively liquid-filled photonic crystal fibers," Opt. Express 18, 25232-25240 (2010).

Q 43.4 Wed 17:15 SCH A118

Tunable thin film Fabry-Pérot filters directly coated on the end-faces of optical fibers — •Dawid Schweda[1], Stefan Meister[1], Marcus Dziedzina[1], Ronny Juhre[1], Stefan Prorok[2], Manfred Eich[2], and Hans J. Eichler[1] — [1]Technische Universität Berlin, Institut für Optik und Atomare Physik, Berlin, Germany — [2]Technische Universität Hamburg-Harburg, Hamburg, Germany

Thin film Fabry-Pérot filters which act as narrow bandpass filters were directly coated on fiber end-faces to achieve a very high level of integration with a reduction of optical elements. Possible fields of application are sensing, monitoring and telecommunication. The Fabry-Pérot filters were realized as thin film dielectric Bragg mirrors in combination with an electro-optical (eo) polymer as the spacer material. Filter bandwidths of less than 1nm were achieved resulting in a Q-factor of more than 2200. With additionally integrated films of transparent conductive oxides used as electrodes, e.g. indium tin oxide (ITO), the filters become tunable. The initially poled and therefore anisotropic eo-polymer spacer performs a Pockels effect during the application of an electrical field, which leads to a change in the refractive index of the spacer. Low drive voltages of several volts, in dependency of the poling efficiency and the applicable field strength, already lead to a shift of the transmitted wavelength in the nanometer range. While in general any filter band can be achieved by the adjustment of the design parameters, focus have been taken on the telecommunication wavelength of 1550nm.