Applied Physics & OSA

Optics Seminar

3D Sub-Wavelength Photonic Circuits in a Waveguiding Configuration Fabricated by Fast Ions Implantations in Electrooptic Substrates

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Abstract:

Refractive index engineering (RIEng) by ions implantation in electrooptical substrates is a generic methodology for constructing complex integrated circuits of electrooptic and nanophotonic devices with subwavelength features that will operate in both the visible and near IR spectral range. The ions penetrate to various depths, depending on their energy, and change the local index of refraction in the material. RIEng will enable the construction of circuits in which optical components, electrooptic devices and photonic structures are interconnected by waveguides and operate in unison to perform a complex task. Potassium lithium tantalate niobate (KLTN) is the optimal medium for constructing a variety of active electrooptic devices since it allows induced birefringence of 10^{-2} with moderate applied fields. As it is operated in the paraelectric phase it is immune to optical damage and the amorphized regions are thermally and optically stable. A waveguide with cladding constructed by the implantation had a propagation loss of 0.1 dB/cm. It was shown that by consecutive implantation at different energies it was possible to construct a slab waveguide buried approximately 25 microns below the surface of the substrate. Performing the implantation through a stopping mask with varying thickness allows one to construct complex waveguiding structures with complex features.

Brief Biography:

Professor Aharon J. Agranat is the chairman of the department of Applied Physics, the director of the Brojde center for innovative engineering and computer science, and the Jaller Professor of Applied Science at the Hebrew University of Jerusalem. From 1986 to 1997 he was a senior research fellow at Caltech where he worked on the development of microelectronic artificial neural networks based on charge transfer devices which he invented, and the investigation of paraelectric photorefractive crystals.

Agranat is the inventor of Electroholography which is a generic wavelength selective photonic switching method. For the invention of Electroholography and the KLTN crystal Agranat was awarded the Discover Innovation Award for the leading invention in communications in 2001.Agranat is a Fellow of the Optical Society of America, a member of the Hebrew University Interdisciplinary Center of Neuro-Computing, and an associate editor of the international journal "Fiber and Integrated Optics".He was also a cofounder of Trellis–Photonics that was founded for exploiting Electroholography in telecommunication applications.

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Refreshments will be available in the Watson Lobby at 3:45pm