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Hong Kong Chapter

SEMINAR
Center for Advanced Research in Photonics
Department of Electronic Engineering
The Chinese University of Hong Kong

Date: Tuesday 5 February 2008
Time: 2.00pm - 3.00 pm
Venue: Room 222 Ho Sin Hang Engineering Building, The Chinese University of Hong Kong

Contemporary approaches in all-optical processing: exploiting novel materials, structures and wavelengths.

Professor Roberto Morandotti,
University of Quebec, Institut National de la Recherche Scientifique (INRS).

ABSTRACT: In this talk, we will describe our approach to some compelling problems in contemporary photonics. In the first part, we will review how optical spatial solitons may be considered as viable candidates in all-optical switching and routing. In particular, a special class of spatial solitons (propagating in a periodical optical potential) has recently shown several fascinating characteristics, including an extremely interesting spatio-temporal dynamics. These properties may lead, for example, to quasi collapse in media with anomalous dispersion (such as glass), to the formation of discrete X-waves in media with normal dispersion (such as AlGaAs), and in general, to various configurations for all-optical pulse shaping in an integrated format. In the second part of the talk, we will review our efforts towards the development of novel enabling photonics materials, based on thin film technology. Specifically, the electro-optical coefficient r33 of a novel ferroelectric compound (Calcium Barium Niobate) to be used in high speed integrated optics has been estimated using a single beam set-up in a reflection geometry on thin film samples. The quality of the electrode used to apply the exciting field was found to be a critical parameter.
Following an electrode quality optimization we estimated a lower bound for the r33 coefficient as large as 130 pm/V. Clearly, the proposed thin film technology may find interesting applications in silicon based optoelectronic technology. Finally, we will describe our recent efforts towards the development of high power sources aimed to the investigation of nonlinear Terahertz optics.In particular, we have recently demonstrated at the ALLS facility (INRS-EMT) the generation μJ-level, single-cycle terahertz pulses by optical rectification from a large-aperture ZnTe single crystal wafer. Energies up to 1.5 μJ per pulse and a spectral range extending to 3 THz were obtained using a 100 Hz Ti:sapphire laser source and a 75-mm-diameter, 0.5-mm-thick, (110) ZnTe crystal, corresponding to an average power of 150 μW and an energy conversion efficiency of 3.1 x 10-5 . We also demonstrate real-time imaging of the focused terahertz beam using a pyroelectric infrared camera.

Speaker Biography
PROF. MORANDOTTI has a broad experience in nonlinear optics, where he has established a remarkable track record during the last five years. In particular, his expertise ranges from the fabrication of micro and nano- photonic structures to the use of various characterization techniques in optics. His recent interests include the study of optical discrete solitons in AlGaAs nonlinear arrays and of spatio-temporal solitons (light bullets) in glass waveguides. He is author/coauthor of more than 50 journal and conference papers, including several articles recently published in PRL and numerous invited papers.

***** All are welcome to attend *****

For further information please contact Professor H.K.Tsang (Tel. 26098254)