THE CHINESE UNIVERSITY OF HONG KONG
Centre for Advanced Research in Photonics &
Department of Electronic Engineering

Seminar

Nano Photonic Architectures for Novel Photonics / Electronics Hybrid Integration Architectures

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Date: 27 April 2018 (Friday)
Time: 11.00 am - Noon
Venue: Rm 222, Ho Sin Hang Engineering Building, CUHK

Abstract: In this talk I plan to discuss two classes of nanoscale devices that address unmet performance demands for applications in sensing and data communications. The performance of emerging generations of high-speed, integrated electronic circuits is increasingly dictated by interconnect density and latency as well as by power consumption. To alleviate these limitations, data communications using photons has been deployed, where photonic circuits and devices are integrated on platforms compatible with conventional electronic technologies. Within the dominant platform; namely Si, dielectric waveguides confine light via total internal reflection. This imposes bounds on minimizing device dimensions and density of integration. Those bounds arise due to the diffraction limit and the cross-coupling between neighbouring waveguides.

Nanoscale Plasmonic waveguides provide the unique ability to confine light within a few nanometers and allow for near perfect transmission through sharp bends as well as efficient light distribution between orthogonally intersecting junctions. With these structures as a building block, new levels of optoelectronic integration and performance metrics for athermal transceivers with achievable bandwidths in excess of 500 Gbps. Nano-scale waveguides can also incorporate optofluidic capabilities for enhancing the retrieved FTIR and Raman signal in liquids. On-chip sensing is the next frontier in integrated optoelectronic circuits. As optoelectronic technologies merge electronic and photonic devices to enhance the capacity of emerging generation of chips, this merger provides new paradigms of functional integration that can benefit optoelectronic sensing on an unpresented scale. Recent progress in designing, fabricating and characterizing different nanostructures and biological molecules utilizing these optofluidic architectures will be discussed including performance of Raman sensing platforms for detecting aerosols and liquids with a sensitivity in the nanoMolar scale using hand held devices.

About the Speaker

Dr Amr S. Helmy worked at Agilent Technologies, R&D division, in the UK between 2000 and 2004. At Agilent his responsibilities included developing InP-based photonic semiconductor integrated circuits and high-powered submarine-class 980 nm pump lasers. He received his Ph.D. and M.Sc. from the University of Glasgow with a focus on photonic devices and fabrication technologies, in 1999 and 1995 respectively. He received his B.Sc. from Cairo University in 1993, in electronics and telecommunications engineering science. His research interests include photonic device physics and characterization techniques, with emphasis on nonlinear optics in III-V semiconductors; applied optical spectroscopy in III-V optoelectronic devices and materials; IIIV fabrication and monolithic integration techniques. Amr has served the community in numerous roles. He has served as Vice President Membership for the IEEE Photonics Society (2008-2010). He is currently the CLEO Program Chair (2018-2020), and he previously served as the chair for the Semiconductor Lasers committee. He also serves as the Technical Program Chair for IPC 2016-2018, having previously served as the chair for the committees on Semiconductor Lasers, Optical Materials and Metamaterials as well as the committees on Photonic Integration and Packaging. He has served as an associate editor for the Photonics Journal and is currently an associate editor for Optics Express.

*** All are welcome to attend. Please contact. Prof H.K.Tsang hktsang@cuhk.edu.hk for enquiries ***