

The Hong Kong University of Science and Technology
Department of Electrical and Electronic Engineering
AND
IEEE LEOS (HK CHAPTER)

JOINT SEMINAR

Micro-Ring Resonator – a VLSI Platform for Optics?

By

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Abstract

Current and future development trends in optical communications/networking, interconnects, sensors, and other optics related applications call for large scale integrated optics/optoelectronics technology. Two of the key elements for large scale integration of planar Lightwave circuits (PLC) are high index contrast waveguide material and proper device platform. In this talk we will visit the challenges and discuss a promising PLC device platform –micro-ring resonator.

Although optics boasts advantages of multi-facet of independent properties: amplitude, phase, polarization and wavelength over electronics, these advantages also introduce tremendous challenges for large scale integration. As a case of point: it takes a quarter of wavelength phase change to switch the state in a Mach-Zhender interferometer. That translates into a demanding nonlinear, electro-optic or thermo-optic waveguide property and/or a large device size. This is true for most optical devices based on interference principle. Micro-ring device, on the other hand, is operating under resonance principle. For a high-Q resonance device, only a small change of resonance frequency (phase) can produce the desired switching state. Thus micro-ring structure has been touted as a promising PLC building block. We shall examine the potentials and difficulties of realizing micro-ring devices in large scale integrated PLC systems.

Biography

Professor Yung Jui (Ray) Chen received his BS in Physics from National Tsing Hua University in 1969 and Ph.D. in Physics at the University of Pennsylvania (1976). After a brief postdoctoral period at Penn, he joined the Advanced Microelectronic Laboratory at McDonnell Douglas Astronautics Co. in 1977. From 1980 to 1987, Dr. Chen conducted fiber optical communications related research at GTE Laboratories. During the ten years in industry, he worked on MOS/MNOS VLSI technology, wafer scale integration, Ultra- fast optical spectroscopy, linear and nonlinear optics of semiconductors and organic polymers, integrated optics and optoelectronic devices. In 1987, he switched to academe and became one of the early founding faculty members of the Department of Electrical Engineering at University of Maryland, Baltimore County.

Prof. Chen is currently a full professor of Computer Science and Electrical Engineering and the Director of Photonics Technology Laboratory. His group's current research interest covers photonic integrated device design and processing, material sciences and physics, WDM broadband optical communications and networking. Prof. Chen is a fellow of Optical Society of America and Photonics Society of Chinese Americans, senior member of IEEE and member of American Physical Society. He is currently also the UMBC Presidential Research Professor.

Date: 28 June 2005 (Tuesday)
Time: 10:30 – 11:30
Venue: Room 1504, 1/F (lift 25, 26)
Academic Complex, HKUST

****** ALL ARE WELCOME ******