KOÇ UNIVERSITY

Distinguished Lecturer Series of the IEEE Lasers and Electro-Optics Society

Speaker: J. G. Eden
Department of Electrical and Computer Engineering
University of Illinois at Urbana-Champaign

Date: Thursday, April 28, 2005
Time: 16:45 (Tea and cookies will be served at 16:30)
Place: Science Building, Room Z42

Title: New Opportunities in Photonics Applications: Microcavity Discharge Devices and Arrays as Emitters and Photodetectors

Abstract:
Microcavity discharge (microplasma) devices are a new generation of micro-optical sources and detectors that have been fabricated in multilayer semiconductor, ceramic, and metal/dielectric/metal structures. Capable of producing photons from the infrared to beyond the ultraviolet spectral region, these devices are well suited for integration with micro-optoelectronic, fluidic, and mechanical systems. The remarkable properties of glow discharges confined to mesoscopic dimensions — including nanoliter volumes, operation at atmospheric pressure (and beyond) and specific power loadings of tens of kW-cm–3 — are discussed. The optical and electrical characteristics of devices as small as 10 μm, and arrays with 4 • 104 pixels at packing densities 104 cm–2 are presented. Also, a microdischarge-excited optical amplifier has been demonstrated. Gain on the 460.03 nm transition of the singly-charged Xe ion has been observed in a segmented, linear array of microdischarges produced in a multilayer ceramic chip weighing only 0.5 g but having a gain length of ~1 cm. Photodetection in the ultraviolet, visible and near-infrared with microplasma devices having pyramidal Si microcavity cathodes has been observed and is described.

Biography:
J. GARY EDEN received the Ph.D. in Electrical Engineering from the University of Illinois, Urbana, and was appointed a National Research Council Post-Doctoral Research Associate at the U.S. Naval Research Laboratory (Washington, DC) in 1976. As a research physicist in the Laser Physics Branch (Optical Sciences Division) of NRL from 1976 to 1979, he made several contributions to ultraviolet and visible lasers and laser spectroscopy, including the co-discovery of the KrCl rare gas-halide excimer laser and the first proton beam-pumped lasers. Since joining the University of Illinois faculty in 1979, he has been engaged in research in molecular and ultrafast laser spectroscopy, visible and ultraviolet lasers (including the first ultraviolet and violet fiber lasers), high optical field-matter interactions, and microplasma devices. He is a Fellow of the IEEE, the Optical Society of America and the American Physical Society, Past Editor-in-Chief of the IEEE Journal of Quantum Electronics and, in 1998, served as President of the IEEE Lasers and Electro-Optics Society (LEOS). Dr. Eden has received the LEOS Distinguished Service Award and, in 2000, was awarded an IEEE Third Millennium medal. At the University of Illinois, he has served as Associate Vice-Chancellor for Research, Assistant Dean of the College of Engineering, and Associate Dean of the Graduate College. Dr. Eden was the James F. Towey Scholar at the University of Illinois from 1996 through 1999.
