

ECE 793A - GRADUATE SEMINAR
(Required for Communication and Control & Electrophysics Area Students)
Everyone is invited to attend.

“Dense Integration of Chip-scale Optical Functionalities Using Photonic Crystals”

Ali Adibi

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School of Electrical and Computer Engineering

DATE: FRIDAY, DECEMBER 1, 2006

TIME: 1:30PM – 3:30PM

PLACE: 132 MARSTON HALL

Abstract:

Photonic crystals are excellent candidates for the development of all-optical integrated photonic circuits. The unique advantage of photonic crystals is the possibility of using them for designing electromagnetic modes (dispersion, field profile, etc.). After a short introduction to photonic crystals and their properties, I present a systematic method for mode engineering in photonic crystal devices with key functionalities for communications and sensing applications. Among several unique devices that can be implemented for integrated photonics, I describe in detail how an optimal ultra-compact superprism-based wavelength demultiplexer can be designed based on engineering dispersion of the photonic crystal modes out of the photonic bandgap. Finally, the potential of photonic crystals for dense integration of these functionalities in the form of an integrated photonic circuit for a variety of applications including optical communications, optical signal processing, and lab-on-a-chip sensing will be discussed.

Bio:

Ali Adibi is an associate professor in the School of Electrical and Computer Engineering and the director for center for Advanced Processing-tools for Electromagnetic/acoustics Xtals (APEX) at Georgia Institute of Technology. He was born in Shiraz, Iran in 1967. He received his B.S.E.E. from Shiraz University (Iran) in 1990, and received his M.S.E.E. and Ph.D. degrees from the Georgia Institute of Technology (1994) and the California Institute of Technology (1999), respectively. His Ph.D. research resulted in a breakthrough in persistent holographic storage in photorefractive crystals. He worked as a postdoctoral scholar at the California Institute of Technology from 1999 to 2000. He has been an assistant professor from 2000 to 2004 in the School of Electrical and Computer Engineering at the Georgia Institute of Technology, where he is now an associate professor. His research interests include holographic data storage, holographic optical elements for optical communications; 3D optical pattern recognition; design, characterization, and applications of photonic crystals for chip-scale WDM and biosensors; spectrometers for bio and environmental sensing; in vivo imaging using quantum dots, optical coherence tomography, silicon photonics, slow light structures, ultra-dense and ultra-fast optical interconnects; and optical communications and networking. Dr. Adibi has been the conference chair for the “Photonic Crystal Materials and Devices” conference in the Photonic West Meeting since 2001, and the program chair for the “Nanotechnology” program in the Photonic West Meeting since 2002. He has served as a technical committee member for several conferences organized by IEEE, Optical Society of America (OSA) and The International Society for Optical Engineering (SPIE). He is the recipient of numerous awards including the Presidential Early Career Award for Scientists and Engineers (PECASE), Packard Fellowship (from the David and Lucile Packard Foundation), the NSF CAREER Award (from National Science Foundation), the SCEEE Young Faculty Development Award (from the Southeastern Center for Electrical Engineering Education), the NASA Space Act Award (from NASA), SPIE’s Young Investigator Award, Outstanding Junior ECE Faculty Award (from Georgia Tech), Howard Ector Outstanding Teacher Award (from Georgia Tech), Richard M. Bass Outstanding Teacher Award (from Georgia Tech), Charles H. Wilts Prize from Caltech (best EE thesis of the year), New Focus Student Award from the Optical Society of America, Top Student (D. J. Lowell) Award from SPIE, and the Oscar P. Cleaver Award from Georgia Tech (Outstanding EE graduate student

of the year). He is a senior member of IEEE and a member of Sigma Xi, OSA, SPIE, and ASM. He is also the chair of the IEEE LEOS Atlanta Chapter.