

# Photonics Workshop

University of Minnesota  
Minneapolis campus

December 11, 2002

## **IPRIME**

Industrial Partnership for Research in Interfacial and Materials Engineering

Organizers: David Norris—Chemical Engineering and Materials Science  
Eric Hockert—IPRIME

We would like to invite you to participate in a “Photonics Workshop” at the University of Minnesota on the morning of December 11, 2002. This half-day event, sponsored by the Industrial Partnership for Research in Interfacial and Materials Engineering (IPRIME), aims to provide a venue in which our Industrial Partners can learn about photonics research at the University of Minnesota. The program will highlight a few of the exciting research projects currently being pursued on campus. In addition, it will provide an opportunity for informal discussions between academic and industrial researchers on a much broader range of photonics-related topics. We sincerely hope that you will be able to join us. Feel free to invite others from your organization.

Location: EE/CS 3-180 (Electrical Engineering and Computer Science building)  
See <http://onestop.umn.edu/Maps/EECSsci/EECSsci-map.html> for building and parking information.

Registration: Please RSVP (no cost) to Eric Hockert at [ehockert@cems.umn.edu](mailto:ehockert@cems.umn.edu) by December 6, 2002. Include your name, company, phone, and E-mail address.

### Schedule

8:30am Coffee and registration (Reception room EE/CS 3-176)

8:45am Welcome and introduction—David Norris

9:00am **James Leger**—Electrical and Computer Engineering

Applications of microoptics to lasers, metrology, and sensors

New fabrication methods make it possible to fabricate advanced microoptical structures with unprecedented precision. In this talk, I will review applications of these microoptical elements to laser resonator design, metrology, and sensor technology.

- 9:30am **Fadil Santosa**—Institute for Mathematics and its Applications (IMA)
- Optimization methods for design of photonic bandgap devices
- In his presentation at the recent PECS IV (Photonic and Electromagnetic Crystals Structures) conference, one of the luminaries in the field of photonics, Professor Eli Yablanovitch, ended his talk with a statement that in developing photonic bandgap circuits, the main tools that are needed are mathematical techniques to solve what he calls "inverse and optimization problems". In this presentation, the speaker will present an optimization approach to design problems in photonic bandgap structures, and provide specific examples of simple devices designed by the method.
- 10:00am Coffee break (Reception room 3-176)
- 10:30am **Heiko Jacobs**—Electrical and Computer Engineering
- Self-assembly based manufacturing
- The ability to assemble multiple components (integrated circuits, sensors, actuators, optical devices, fluidic devices) in two or three dimensions will enable the creation of new microsystems with increased device performance. Traditional assembly reaches fundamental limitations on a micrometer length scale. Self-assembly offers a new approach to the assembly of multi-component microsystems. Our focus at the University of Minnesota is to develop self-assembly strategies and apply them to manufacture integrated devices and systems. We will report on recent advancements in the field of self-assembly based manufacturing and our own achievements in the area of directed self-assembly. Directed self-assembly involves the design of "intelligent" components that undergo self-assembly to form a desired structure.
- 11:00am Second Chances
- Speakers respond to further questions, suggestions, re-frame their main points, and look toward future directions.
- 11:30am Wrap-up
- Follow-up actions  
Further discussions, interactions
- 12:00pm End