

University of Rochester
Department of Electrical and Computer Engineering
Colloquia Series

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12:00-1:00 PM
101 Goergen Hall

**Exploiting Light-Matter Interaction in Optical Biosensors
for Improved Performance**

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Abstract: The accurate and rapid detection of chemical and biological molecules is important for a wide range of applications spanning medical diagnostics, food safety, environmental monitoring, and homeland security. In most cases, molecular detection by optical means gives the best combination of sensitivity, reproducibility, and ease of implementation. The sensitivity of optical biosensors is fundamentally derived from the level interaction between light and the target molecules to be detected. This light-matter interaction can be strengthened by either designing the sensor structure in such a way as to promote strongly confined fields in selected regions where molecules can attach or by increasing the number of target molecules that are captured in regions where light is localized. This talk will discuss both approaches to increasing light-matter interaction, and hence sensitivity, of optical biosensors. In particular, several biosensor designs, including photonic crystals with multiple defect holes, suspended ring resonators, and Bloch surface wave structures will be described in the silicon-on-insulator and porous silicon materials systems. A method of in-situ bioreceptor synthesis will also be discussed as a means of increasing bioreceptor density. Several illustrative examples of specific molecular detection using optical biosensors with enhanced light-matter interaction will be presented.

BIO: Sharon Weiss is currently Associate Professor of Electrical Engineering, Associate Professor of Physics, and Deputy Director of the Vanderbilt Institute of Nanoscale Science and Engineering at Vanderbilt University. She received her BS and PhD degrees from the Institute of Optics at the University of Rochester. Prof. Weiss has been awarded a Presidential Early Career Award for Scientists and Engineers (PECASE), an NSF CAREER award, and an ARO Young Investigator Award. Her research interests are primarily in the areas of photonics, optoelectronics, nanoscience and technology, and optical properties of materials.

Lunch Provided