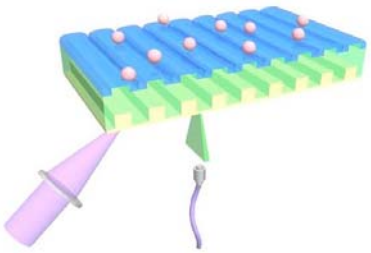
NANOHOUR

Wednesday, October 15, 2008
3:00 PM
Beckman Institute - Room 3269

Label Free Biosensor Incorporating a Replica-Molded, Vertically Emitting Distributed Feedback Laser

Meng Lu – Graduate Student, Electrical and Computer Engineering Department



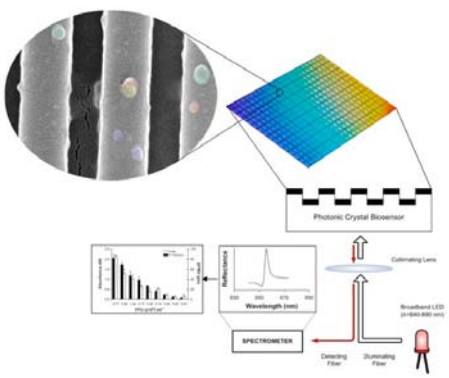
A label free biosensor based upon a vertically-emitting DFB laser has been demonstrated. The sensor represents a departure from conventional high *Q* factor passive resonant optical sensors to improve the sensor detection limit. Since the DFB laser sensor actively generates its own narrowband high intensity output, the system has no stringent requirements on the coupling alignments resulting in a simple, robust illumination and detection configuration.

The DFB laser sensor comprises a one-dimensional organic grating coated with laser dye-doped polymer as the gain medium. The fabricated sensor arrays are single-use and disposable. Adsorption of biomolecules onto the laser surface alters the DFB laser emission wavelength, thereby permitting the kinetic adsorption of a protein polymer monolayer or the specific binding of small molecules to be quantified. A bulk refractive index sensitivity of 99.4 nm per refractive index unit was found. The dynamic detection of multiple layers of charged polyelectrolyte was used to characterize the surface sensitivity, dynamic range, and spatial extent of the evanescent field. Furthermore, a protein A-human IgG assay shows the sensor's capability to sustain stable antibody and to capture a highly affinity antigen. The DFB laser sensor was also used to detect protein to small molecular specific binding.

Rapid Label-Free Selective Detection of Porcine Rotavirus using Photonic Crystal Biosensors

Leo Chan – Graduate Student, Electrical and Computer Engineering Department

A label-free assay for the direct detection of intact viable rotaviruses using photonic crystal biosensors is demonstrated with sensitivity comparable to an enzyme-linked immunosorbent assay kit (ELISA), but with a simple and rapid assay procedure. This presentation describes the design and operation of the biosensor, surface functionalization with anti-rotavirus antibody, characterization of the detection sensitivity, and demonstration of selectivity with respect to nontarget virus particles. A 30-minute test yielded a detection sensitivity of 36 focus forming units of a partially processed water test sample without the use of any external reagents, resulting in a method that would be applicable to groundwater viral contamination monitoring. Detection of rotaviruses specifically binding to immobilized anti-rotavirus antibody was shown by comparing with two other nonspecific viruses, the Feline calici and parvo viruses. Furthermore, the detection method was validated by showing the specific binding of rotaviruses to anti-rotavirus antibody out of a set of human, goat, sheep immunoglobulin G (IgG), anti-rotavirus antibody, and fraction of goat IgG.



Coffee and cookies will be served.

http://nanohour.beckman.uiuc.edu ***Subscribe to the Nanohour RSS feed!***