

Fall 2006 SEMINAR SERIES

F21C Bioprocessing & Biosensing Center

• DIVISION OF FOOD SYSTEMS & BIOENGINEERING •

PRESENTER: **Dr. J. Todd Hastings, Assistant Professor**
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Nanoscale Science and Engineering (CeNSE)
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TITLE: **Self-referenced Surface-Plasmon Resonance Sensing
using Long- and Short-Range Surface Plasmons**

ABSTRACT:

Surface-plasmon polaritons are bound electromagnetic waves that propagate along the interface of two materials with real dielectric constants of opposite sign, i.e. a dielectric and certain metals such as gold or silver. Surface-plasmon resonance (SPR) sensors use surface-plasmon waves to detect refractive-index changes immediately adjacent to the metal layer. This refractive index change most often results from binding of a target analyte to the functionalized surface of the sensor. SPR has become a widely used, label free technique to detect and study biological and chemical interactions. Nevertheless, a fundamental challenge remains unresolved: How does one differentiate between non-specific effects (temperature fluctuations, solution refractive index changes, non-specific binding of interferents, etc.) and detection of a target analyte? This problem currently limits the effectiveness of SPR in complex biological samples and for medical, environmental, food safety, and defense applications that require field deployable sensors.

To address this problem we have developed a novel approach to SPR sensing that uses two surface plasmon waves, long- and short- range plasmon-polaritons, propagating along the same region of a gold film. The two plasmon waves penetrate to different depths in the solution, and thus allow one to differentiate surface interactions and bulk refractive index changes. Such a sensor offers self-referenced measurements with no spatial separation between detection and reference regions; requires only a single channel spectroscopic interrogation system; and is simple to fabricate, functionalize, and calibrate because the sensor surface is composed of only one material. Here we present a sensor design that allows simultaneous coupling to both long- and short- range surface-plasmons and demonstrate its self-referencing capabilities by monitoring alkanethiol self-assembled monolayer formation and streptavidin-biotin binding.

DATE • TIME • LOCATION:

Tuesday, October 10, 4:00pm
Ag Eng Bldg 105 • Refreshments