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Department of Chemistry

Seminar

9:45 a.m. Thursday, October 9 • 331 Smith Hall



Professor

Reginald Penner

Department of Chemistry and
Department of Chemical Engineering and Materials Science
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Biosensors for Early Cancer Detection Based Upon Electrical Interfaces to Virus Particles

Research interests: the use of electrodeposition to fabricate nanometer-scale electrical circuits.
Website: http://www.faculty.uci.edu/profile.cfm?faculty_id=2040

Abstract

In this talk, I'll describe a new approach to biosensors that has as its objective the development of ultra-cheap, disposable biosensors that are able to detect virtually any analyte molecule. The realization of this biosensor is made possible by two new developments in our laboratory. The first is a nanowire fabrication technique called Lithographically Patterned Nanowire Electrodeposition (LPNE) that permits very long (> 1 cm), very uniform noble metal nanowires as small as 6 nm x 20 nm to be patterned on glass surfaces. Previously, such nanowires could only be obtained using electron beam lithography—a tedious and expensive fabrication method.

The second is the demonstration that filamentous bacteriophage particles, that have been engineered using phage display to selectively recognize and bind a particular analyte molecule, can be immobilized onto electrode surfaces. The resulting “virus surfaces” retain the ability to recognize and bind molecules from a buffer solution. In fact, these surfaces show kinetic and thermodynamic binding properties for selected analyte molecules that are comparable to immobilized monoclonal antibodies, the gold standard receptors for biosensing.

How can LPNE and virus particles be used in conjunction to prepare a biosensor? Three experimental approaches will be described. In one of these, nanowires of the conductive polymer PEDOT (poly(3,4-ethylenedioxythiophene)) are fabricated in which virus particles are entrained. These composite nanowires show a change in their electrical impedance upon exposure to peptides that selectively bind to the entrained virus particles.

Host: Professor Philippe Buhlmann
Refreshments will be served prior to the seminar.