**DEPARTMENT OF MOLECULAR SCIENCE AND NANOSYSTEMS**

**Seminars of the PhD Programme in Chemistry**

# *biosensors for early cancer detection based upon electrical interfaces to virus particles*


## Reginald M. Penner

***Department of Chemistry at the University of California, Irvine***


**June 12th, 2017**
**at 12:00**
**Conference Room**
**Scientific Campus - via Torino 155, Venezia Mestre**

L'evento verrà trasmesso in videoconferenza presso il Dipartimento di Scienze Chimiche e Farmaceutiche dell'università di Trieste.

*L'organizzatore*
*prof. Paolo Ugo*

*Il Vice-Coordinatore del Dottorato in Chimica*
*prof. Maurizio Selva*

Università Ca'Foscari Venezia

dottorato.chimica

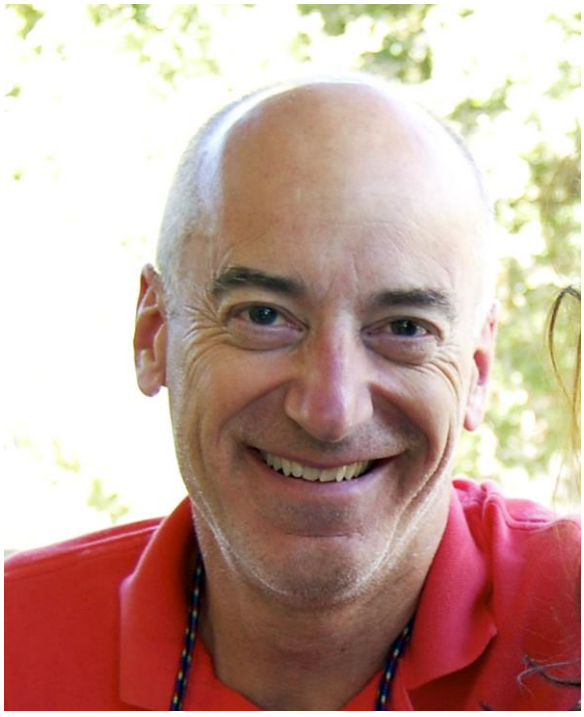
**Abstract**:

Biosensor technologies that enable the rapid measurement of disease biomarkers in unprocessed biological samples, including blood, urine, saliva, and cerebrospinal fluids, remain elusive and highly sought after. The ultimate goal are devices that can be used with minimal training by physicians and patients to provide actionable information at the point-of-care (PoC). In addition to simplicity, analysis speed and sensitivity are critically important metrics for PoC biosensors but the technology must also provide for sensor-to-sensor reproducibility, manufacturability, and low cost.

A new approach to PoC detection of protein disease markers involves the use of virus particles, rather than antibodies, within a bioaffinity capture layer. Relative to antibodies, virus particles have several advantages that make them attractive for emerging PoC sensor technologies: First, virus particles can be engineered to bind virtually any protein – even toxic proteins for which antibody development is difficult. Second, virus particles are less thermally and chemically labile than antibodies, dramatically simplifying the storage and transport of biosensors that rely on virus–based bioaffinity layers. Finally, virus particles that are capable of antibody-like affinities can be produced in quantity for far lower cost.

In this talk I describe a PoC biosensor that exploits electrodeposited bioaffinity layers that consist of a composite of virus particles with an electrically conductive polymer, poly(3,4 ethylenedioxythiophene) or PEDOT.

**Biography: Reginald M. Penner**



Reginald Penner is Chancellor's Professor in the Department of Chemistry at the University of California, Irvine. Professor Penner attended Gustavus Adolphus College in Saint Peter, Minnesota where he obtained B.A. degrees in Chemistry and Biology in 1983. He studied at Texas A&M University beginning in 1983 with Professor Charles R. Martin and he received a Ph.D. in Chemistry in 1987. He proceeded to postdoctoral appointments at Stanford University and Caltech working with Professor Nate Lewis, before being appointed at UCI in 1990. Professor Penner is an electrochemist whose research group develops methods based upon electrodeposition for making nanomaterials, such as nanowires, composed of metals and semiconductors. With his students, he has more than 160 research publications to date. He is an A.P. Sloan Fellow, a Camille and Henry Dreyfus Teacher-Scholar, an NSF and ONR Young Investigator, and a Fellow of the American Association for the Advancement of Science (AAAS). He received the 2009 Faraday Medal from the Royal Society of Chemistry of the UK, the 2016 Charles N. Reilley Award from the Society for Electroanalytical Chemistry, and the 2016 Division of Analytical Chemistry Award in Electrochemistry.