

## Czech Chemical Society Lectures

**WHEN:** May 12, 2016, **13:30 – 15:45**

**WHERE:** Seminar room 132, pavilion A11, Masaryk University Campus  
Bohunice, Brno

Lectures will last about an hour each (40 minutes talk + 20 minutes discussion) and will be separated by a 5 minutes break.

### **Prof. P.Hubert Mutin**

Institut Charles Gerhardt Montpellier, France

#### *Functionalization of Metal and Metal Oxide Surfaces with Phosphonate Coupling Molecules*

Due to their affinity for a wide range of inorganic substrates, phosphonic acids and their derivatives are finding increasing applications as coupling molecules to anchor organic groups to inorganic surfaces. In the first part of this presentation, I wish to present the basics of surface modification with phosphonate compounds: bonding mode, competition between grafting and dissolution-precipitation. In the second part, I shall illustrate the possibilities offered by phosphonate coupling molecules to functionalize metal and metal oxide flat substrates and nanoparticles: selective surface modification of patterned SiO<sub>2</sub>-TiO<sub>2</sub> substrates, phosphonate monolayers on titanium and stainless steel for biomaterial applications, "green" surface functionalization of silica nanoparticles in water, phase transfer of titania nanoparticles in aqueous sols.

### **Prof. Vincent Rotello**

University of Massachusetts Amherst, USA

#### *Interfacing Nanomaterials with Biology: Applications in Therapeutics and Diagnostics*

A key issue in the use of nanomaterials is controlling how they interact with themselves and with the outer world. Our research program focuses on the tailoring of nanoparticles of surfaces for a variety of applications, coupling the atomic-level control provided by organic synthesis with the fundamental principles of supramolecular chemistry. Using these nanoparticles, we are developing new strategies for biological applications. This talk will focus on the interfacing of nanoparticles with biosystems, and will discuss the application of self-assembled nanoparticles as delivery vehicles, demonstrating the use of nanoparticle-based capsules for direct delivery of small molecules, proteins, and nucleic acids into the cytosol. Finally, this presentation will also feature the use of nanoparticles for diagnostic applications, focusing on using selective nanoparticle-protein interactions to generate array-based ("chemical nose") sensors for detection of cancer and high throughput screening of therapeutic agents.