

**THE UNIVERSITY OF MELBOURNE  
DEPARTMENT OF CHEMICAL & BIOMOLECULAR ENGINEERING  
DEPARTMENTAL SEMINAR 2009**

**SPEAKER:**       **Prof Marcus Textor**  
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**TOPIC:**           **Surface engineering to direct biological response of biomaterials**

**DATE:**           **Tuesday – 10th February, 2009 @ 12 noon**

**PLACE:**          **Chemical & Biomolecular Engineering Theatre**  
See (<http://www.unimelb.edu.au/campuses/maps.html>)

## **ABSTRACT**

Surface modifications based on biochemical or biological principles are important tools for the fabrication of biosensor chips, biomedical devices such as implants, and of drug delivery carriers. Moreover, well-designed model biointerfaces have substantially contributed in the last decade to a better insight into fundamental aspects of cell-surface interaction.

I will provide an overview on tools enabling the surface engineer to tailor the interface of biomaterials and biosensors, with special emphasis on self-assembly approaches of eliminating non-specific adsorption (rendering surfaces “non-fouling” through PEG- or oxazoline-based chemistry) and adding to such a silent surface biological functionalities such as peptides, carbohydrates/sugars, proteins/antibodies, growth factors or vesicles.

Preservation of active conformation and optimum presentation (orientation, density and steric availability) of surface-immobilized moieties are particular challenges in this field. Adhesion of self-assembled functional molecules and polymers to substrates is crucial for many applications; adhesion chemistry derived from mussel adhesive proteins is one of the promising, more recent approaches.

I will also address the importance of dynamic, *in situ* techniques to quantitatively monitor the kinetics of adsorption in the context of both the surface modification by selfassembly as well as the determination of specific biointeractions (e.g., optical waveguide spectroscopy, quartz crystal microbalance). I will address the importance of using complementary techniques to learn about both adsorbed mass and interfacial architecture of (supra)molecular assemblies.

A second part will cover the functionalization of particles, e.g. superparamagnetic ironoxide nanoparticles (SPION) for MRI applications, based on self assembly of functional molecules with biomimetic, catechol-based anchorage groups and antibodies to target VCAM receptors in inflamed, atherosclerotic plaque. In a third part I will present preliminary data on microfabricated substrates as a platform to host single or multiple cells in controlled 2.5D microenvironments (“cells in wells”) and to study the effect of (variable) substrate stiffness, (bio)chemical cues of the well surfaces and dimensionality on cell function. Such cell chips may have future applications in drug screening and toxicity testing.

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