

## MSc. Projects

### Polymer brush coatings for non-fouling biomedical applications

The ability for surfaces to resist various nano to micro-scale biological entities, such as biomolecules and mammalian/bacterial cells, is of paramount importance in a variety of biomedical applications ranging from implants to biosensors. Non-specific bio-adsorption can lead to significant complications and reduction in the performance of biomedical devices. For example, non-specific adsorption of proteins can (1) trigger adverse biological reactions from implant devices and, (2) block bio-recognition sites for analytes, consequently lowering the sensitivity of diagnostic and bioassay devices.

Over the last several decades, scientists and engineers have been pursuing in developing a surface that provides 'zero-adsorption' of proteins and cells. Numerous theoretical and experimental studies have identified that several types of polymer brush coatings can be used as a 'resistant shield' towards unwanted bio-adsorption. Among the range of parameters recognized, polymer brush length and density are found to be critical for achieving effective surface biological resistance.

MSc. project positions are available, where you will investigate the effect of length (molecular weight) and density (number of chains/area) of surface tethered non-fouling polymer brushes towards bio-resistance. You will employ physical (atomic force microscopy (AFM)) and chemical (X-ray photoelectron spectroscopy (XPS) and time of flight secondary ion mass spectrometry (ToF-SIMS)) surface nano-characterization techniques to probe the polymer brush architecture and monitor the level of biological adsorption in biomedically relevant conditions *in vitro*.

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