**Project Title**

Nanocharacterization of Biomolecular Inspired Modified Electrode Surfaces

**Supervisors**

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**Project Description**

In this study, we will use the peptide motif, RGD or arginine-glycine-aspartic acid to promote cell adhesion onto a polarized electrode using a self-assembled monolayer (SAM) modified doped silicon wafer surface [1]. The SAM forming molecule will have an electrochemically cleavable group incorporated (refer to Figure 1, noting references [2-3]). In this way, we can control the presentation of a surface to cells so that cell adhesion is either promoted or prevented. It is expected that this new knowledge will increase significantly our understanding of fundamental cellular processes such as cell growth, cell differentiation and cell death, as well as providing a molecular basis for diseases such as inflammation, cancer, cardiovascular disease as well as wound healing.

![Figure 1: Schematic diagram showing how a hydrophilic monolayer with carboxylate functionalities that will wind down onto an anodised electrode surface.](image)

In this study, these novel biomolecular structures will be probed using electrochemical techniques such as cyclic voltammetry (CV), chronoamperometry (CA), electrochemical impedance spectroscopy (EIS) in conjunction with cutting-edge surface characterization techniques like atomic force microscopy (AFM), neutron reflectometry (NR) and synchrotron radiation (SR)-grazing incidence small angle X-ray scattering (GISAXS). It is significant to note that the proposed NR studies will be undertaken at the OPAL Replacement Research Reactor at The Australian Nuclear Science and Technology Organization (ANSTO), and the planned SR-GISAXS work will be performed at The Australian Synchrotron in Melbourne.

**References**