

# AIBN Master Projects | Prof. Michael Yu

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## Project-1# Title: A Nano-platform for Affordable and Ultra-sensitive Bio-marker Detection

**Lead Investigators: Prof. Michael Yu, Dr. Chang Lei**

### Description

Biomolecules with clinical significance are most often various forms of proteins or peptides at very low concentrations in biological systems. Quantitative analysis of them is a big challenge due to the complexity of bio-samples, but essential for diagnosis and clinical applications. In this project, we focus on developing novel approaches for the sensitive detection of trace amount biomolecules using state-of-the-art nanotechnology.

### Expected outcomes and deliverables

This project involves preparation and characterisation of porous nanomaterials, biomolecules detection and disease diagnosis. Students involved in this project will have opportunities to publish research articles with high impact and be further promoted to become a PhD candidate.

### Required experience

This project is suitable for students with Biochemistry, Chemistry or Medical background. The student who has availability to conduct long-term full-time research in AIBN is preferable.

Contact the project advisor directly to discuss the project and arrange a meeting or AIBN Events ([aibn.events@uq.edu.au](mailto:aibn.events@uq.edu.au)) to arrange a visit to the AIBN lab.

### Contact Information

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## **Project-2# Title: Silica bio-nanomaterials assisted stem cell differentiation for bone repair.**

### **Lead Investigators: Prof. Michael Yu, Dr. Chang Lei**

Bone defects, caused by infections, tumours, traumas, or congenial deformity, usually needs surgical interference and to be repaired with bone grafts or biomaterials. The traditional bone repair strategies usually have slow regeneration rate due to the poor cell adhesion and poor differentiation induction capacity of bone repair materials. This project aims to develop novel biomaterials to promote the differentiation of bone marrow stem cell for bone regeneration. Nanomaterials with functional compositions and porous nanostructures will be fabricated. Their cellular internalisation process and the resulted bone regeneration efficiency will be evaluated. On completion of this project, a next generation of biomaterial with high bone repair efficiency will be developed and the in-depth understanding on the interaction between nanomaterial and stem cell differentiation will be revealed.

### **Expected outcomes and deliverables**

This project involves the synthesis of nanomaterials with various morphology and surface chemistry. Culture of stem cell and related characterization will also be conducted. The project has high potential to become a PhD project and the research outcome generated from this project will be published in top class journals.

### **Required experience**

This project is suitable for students with Biochemistry, Chemistry or Medical background. The student who has availability to conduct long-term full-time research in AIBN is preferable.

Contact the project advisor directly to discuss the project and arrange a meeting or AIBN Events ([aibn.events@uq.edu.au](mailto:aibn.events@uq.edu.au)) to arrange a visit to the AIBN lab.

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