University of Central Lancashire

Research Project/Studentship Description

Project ref: DTC12-22-40	Closing Date: 17 May 2024
School	School of Pharmacy and Biomedical Sciences
Centre	Centre for Smart Materials
Proposed Director of Studies	Professor Subrayal Reddy
Contact Details	smreddy@uclan.ac.uk
Programme (e.g MPhil/PhD)	PhD
Duration of Studentship	3.5 years
Hours (Full or Part Time)	Full Time
Tuition Fees	UK Fees covered (International Students to make up the difference between UK and International Fees)
Maintenance Grant	UKRI Level Stipend (2024/25 rate £19,237 per annum)
Any Entry Requirements (e.g. 2:1 classification/restricted to UK residences only)	UK Bachelor of Science degree (or equivalent qualification) at 2:1 or above in Chemistry or equivalent, or a UK Masters level qualification in a Chemistry-related field
Any Special Requirements (e.g. driving licence)	None
Project Title	

Development and Application of Molecularly Imprinted Polymers as Alternatives to Animal-derived Antibodies for Immunodiagnostic and Research Applications.

Project Description

Animal immunisation is widely used for the development of polyclonal antibodies (pAb) and hybridomas for monoclonal antibody (mAb) production. These antibodies then enter the immunoassay, diagnostic and therapeutic markets in different formats (e.g., purified, conjugated or antiserum), serving test kit industries, private and public-funded laboratories, including veterinary and public health laboratories, and the drug industry. It is an ever-growing multi-billion-dollar market.

Molecularly imprinted polymers (MIPs) are a rapidly evolving class of synthetic receptor with antibody-like affinities. They are low-cost, selective, and biocompatible materials. MIPs are produced in one chemical step within hours and are highly stable even at room temperature. This contrasts with biological antibodies which are produced in an immunised animal host, could take months to produce, if produced at all; and have limited stability. MIPs therefore offer multiple advantages as an antibody replacement technology. The potential applications of MIPs are in diagnostics, medical imaging, bioseparation and therapeutics.

The over-arching project objective is to develop a library of MIPs to reduce/replace animal-derived antibodies and enzyme-labelled antibodies in immunoassay formats leading to the development of novel disease and virus neutralisation diagnostics. We anticipate such MIPs will be used in immunodiagnostics for a range of biologically relevant protein-based disease biomarkers such as in cardiac, cancer and autoimmune diseases. The successful candidate will gain experience in a range of materials characterisation techniques including atomic force microscopy, circular dichroism spectroscopy, dynamic light scattering for particle sizing, environmental scanning electron microscopy for materials imaging, immunoassays and electrochemical techniques. Further, the methods developed will be validated by the student through our collaborations within the antibody industry, NHS diagnostics services, and research institutes focused on preventing and controlling viral diseases.

The successful candidate will have a Chemistry background with a strong interest at the materials chemistry and biological sciences interface.

Studentship Ref Number: DTC12-22-40	Closing Date: 12 April 2024
Project Title:	Development and Application of Molecularly Imprinted Polymers as Alternatives to Animal-derived Antibodies for Immunodiagnostic and Research Applications.
School:	School of Pharmacy and Biomedical Sciences
Centre:	Centre for Smart Materials
Contact:	smreddy@uclan.ac.uk

Attributes	Essential	Desirable	Measured By
Education/ Qualifications	2:1 or above BSc/MChem in Chemistry or related field	Taught components in analytical chemistry and electrochemistry	Graduate certificate and interview
Experience	Polymer synthesis; analytical chemistry characterisation using NMR, IR and UV-Visible spectroscopies	Knowledge of immunology and biological assay techniques; electrochemical techniques	Application form and Interview
Skills/Abilities	Wet laboratory techniques; Good lab bookkeeping; experience of using MS Word, Excel and PowerPoint.	Oral presentation skills; time management; working in a team; independent working	Application form and interview