A Fully funded 3.5-year PhD studentship in Chemical Nanosensors for detection of toxins in food

Supervisors: Prof. Nguyen TK Thanh (UCL) and Dr. Teng Jing Hua Dr. Xiao Di Su (IMRE, A*STAR, Singapore)

Closing Date for Applications: 15 June 2017 or as soon as the suitable candidate is found

Start Date: September 2017

Location: London (1.5 years), Singapore (2 years)

Topics:

This project is to develop novel plasmonic structures for ultra-high sensitivity sensors for fast food safety inspection.

The Studentship

This position is fully funded by the UCL-A*STAR Collaborative Programme via the Centre for Doctoral Training in Molecular Modelling and Materials Science (M3S CDT) at UCL. The student will be registered for a PhD at UCL where he/she will spend year 1 and the first six months of year 4. The second and third years of the PhD will be spent at the A*STAR Institute of Materials Research and Engineering (IMRE) in Singapore. The Studentship will cover tuition fees at UK/EU rate plus a maintenance stipend £16,553 (tax free) pro rata in years 1 and 4. During years 2 and 3, the student will receive a full stipend directly from A*STAR. In addition, A*STAR will provide the student with one-off relocation allowance. **Please note that, due to funding restrictions, only UK/EU citizens are eligible for this studentship.**

The Project

Food safety is a pressing issue worldwide. It is directly related to public health. Food analysis has been largely relying on laboratory based methodologies. Advanced chromatography and mass spectrometry techniques, for example, allow for highly sensitive and accurate detection of chemical contaminants, microorganisms, and toxins etc. However, these laboratory based technologies cannot meet the demand of rapid and on-site detection, due to their cost, bulky size and the requirement of sophisticated laboratory conditions.

Nanomaterials exhibit unique physical and chemical properties related to their nanoscale sizes. They are important signal transducing materials in biosensor development. For food analysis, nanosensors have great potential for on-site rapid detection, with the remaining challenges to be overcome, for example, ultrahigh sensitivity requirement for known analytes, identification of unknown analytes, compatibility with various types of food matrix, and on-site implementation etc. This project aims to address these challenges, focusing on the development of plasmonic metal nanoparticles based sensing techniques. The scopes include (1) developing highly sensitive plasmonic nanostructures through top-down fabrication and bottom up synthesis (or the combination of both) for high sensitivity detection in complex matrix (e.g. 1 bacteria cell in 25g food), (2) studying nanoplasmonic enhanced spectroscopy

(e.g. Raman and anti-stokes Raman) for small molecular weight analyte identification, (3) developing 2D material enhanced metal sensors, and (4) engineering the sensors for on-site application including using portable optical detectors and printing the metal structures onto low-cost paper format.

Scope of work to be carried out at the A*STAR RI and the Partner University

(i) A*STAR RI

The student will work on nano-plasmonic structure fabrication, surface modification for sensing, and optical spectroscopic characterization such as Raman, NSOM, PL, Darkfield optical microscopy.

(ii) Partner University

The student will make gold nanorods and other anisotropic gold nanoparticles in Prof Thanh's lab and full set of charactersation such as DLS, TEM, XRD, FTIR.

The Candidate

The successful applicant should have or expect to achieve a 1st or 2:1 class integrated Masters degree (MEng, MSci, MChem etc.) in Chemistry, Materials Science, or a related discipline. The successful applicant will demonstrate strong interest and self-motivation in the subject, good experimental practice and the ability to think analytically and creatively. Good computer skills, plus good presentation and writing skills in English, are required. Previous research experience in contributing to a collaborative interdisciplinary research environment is highly desirable but not necessary as training will be provided.

Please contact Prof. Nguyen TK Thanh (ntk.thanh@ucl.ac.uk) for further details or to express an interest. Students are advised to look at Prof Thanh website: http://www.ntk-thanh.co.uk to familiarise with her research.

Due to large number of applications only short listed candidates will be contracted. Applications will be accepted until 15 June 2017 but the position will be filled as soon as an appropriate candidate is found.