PhD studentship (Full-time)

Institution	Xi'an Jiaotong-Liverpool University, China
Department	Department of Chemistry
Supervisors	Primary supervisor: Li Yang (Xi'an Jiaotong-Liverpool University) Co-supervisor: Prof. Richard Nichols (University of Liverpool, UK);
Application Deadline	Open until the position is filled
Funding Availability	Funded PhD project (world-wide students)
Project Title	Electrochemical charge transport in single molecules junctions with novel two-dimensional contacts 新型二维晶体单分子器件电子输运行为的电化学研究
Contact	Please email doctoralstudies@xjtlu.edu.cn and copy to li.yang@xjtlu.edu.cn with a subject line of the PhD project title

Requirements:

The candidate should have a first class or upper second class honours degree, or a master's degree (or equivalent qualification), in physical chemistry, materials chemistry and condensed matter physics background. Evidence of good spoken and written English is essential. The candidate should have an IELTS score of 6.5 or above, or an equivalent qualification, if the first language is not English. This position is open to all qualified candidates irrespective of nationality.

Degree:

The student will be awarded a PhD degree from the University of Liverpool (UK) upon successful completion of the program.

Funding:

The PhD studentship is available for three years subject to satisfactory progress by the student. The award covers tuition fees for three years (currently equivalent to RMB 80,000 per annum) and provides a monthly stipend of 3500 RMB as a contribution to living expenses. It also provides up to RMB 16,500 to allow participation at international conferences during the period of the award. It is a condition of the award that holders of XJTLU PhD scholarships carry out 300-500 hours of teaching assistance work per year. The scholarship holder is expected to carry out the major part of his or her research at XJTLU in Suzhou, China. However, he or she is eligible for a research study visit to the University of Liverpool of up to three months, if this is required by the project.

Project Description:

Incorporation of single molecules or groups of molecules into electronic devices holds great promise for decreasing the size and increasing the packing-density of emerging nano-electronic systems. By wiring a single molecule to two electrodes, direct measurement of charge transport through the molecule can be made with a scanning tunneling microscope (STM). To date most single molecule electronics measurements have focused on the use of gold electrodes. Only a few studies have been involving contacts such as indium tin oxide (ITO) or even metals other than gold. However, it is now important that single molecule electronics research addresses the challenge of other novel two-dimensional (2D) contact materials which will have impact in the eventual implementation of molecular electronics. In this respect, gold has a number of drawbacks; including its non-compatibility with complementary metal-oxide-semiconductor (CMOS) technologies, its mobility and also expense. Introducing other electrodes in the proposed study is aimed towards providing cost effective and industrially scalable materials for integrated single molecule electronics beyond the current limits of miniaturization. Recently, 2D nanomaterials have attracted much attention as a potential material for future electronic and photonic applications. When one of the dimensions is extremely reduced, the two-dimensional nanomaterials exhibit unique properties, such as a transition from indirect to direct semiconductor properties. Inspired by the structural analogue of graphene, 2D layer materials with nature semiconducting properties are ideal candidates to replace gold in future nanoelectronics. Novel 2D materials have already been foreseen as an important future technology and work on these materials has only just begun. The aim of this project is to measure single molecules conductance, also under electrochemical conditions, by the use of 2D materials for single molecule electronic devices, including “white graphene” (hexagonal boron nitride, h-BN), molybdenum disulfide (MoS_2) or tungsten disulfide (WS_2). We propose to study the electron transport properties of the molecules as a function of temperature, in different solvents and electrolytes, and with and without the electrochemical gate control.

For more information about doctoral scholarship and PhD programme at Xi’an Jiaotong-Liverpool University (XJTLU): Please visit

http://www.xjtlu.edu.cn/en/admissions/postgraduate/phd-degree/feesscholarships.html

http://www.xjtlu.edu.cn/en/admissions/postgraduate/phd-degree.html.

How to Apply:

Interested applicants are advised to email the following documents to Doctoralstudies@xjtlu.edu.cn (please put the project title and primary supervisor's name in the subject line).

- CV
- Two reference letters
- Personal statement outlining your interest in the position
- Proof of English language proficiency (an IELTS score of above 6.5 or equivalent is required
- Verified school transcripts in both Chinese and English (for international students, only the English version is required)
- Verified certificates of education qualifications in both Chinese and English (for international students, only the English version is required)

Informal enquiries may be addressed to Dr. Li Yang (li.yang@xjtlu.edu.cn), whose personal profile is linked below, http://academic.xjtlu.edu.cn/chem/Staff/li-yang