

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) Co-supervisor: Prof. Cezhou Zhao (Xi'an Jiaotong-Liverpool University)
Application Deadline	Open until the position is filled
Funding Availability	Funded PhD project (world-wide students)
Project Title	Charge Transport in Fully Metal-free Molecular Junctions
Contact	Please email li.yang@xjtlu.edu.cn (principle supervisor's email address) and copy doctoralstudies@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:

Molecular electronics is a field of research that investigates the use of organic molecules as circuit elements at molecular scale (1–10 nm). By wiring a single molecule or a few molecules oriented in parallel between two electrodes, a so-called molecular junction (MJ), direct measurement of charge transport through the molecule can be made with a scanning tunneling microscope (STM). The STM measures the current which flows through the junction in the single molecule analogue of an ammeter. MJs are the foundational unit in molecular electronics and the understanding of its electrical transport is of paramount importance. To date most MJs 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. Our recent finding (Nano Letters, 2016, 16, 6534; Nanoscale, 2016, 8, 14507) suggested that graphene— novel non-metallic 2D materials could serve as promising electrodes to construct non-symmetrical junctions with tunable attenuation factors. The aim of this project is to expand our previous study to construct a fully metal-free MJ by the use of two-dimensional (2D) materials such as graphene or transition metal dichalcogenide (MoS₂, WS₂) as bottom electrode, graphene as top electrode. Electronic transport properties in MJ as a function of binding groups and molecular length will also be explored. Successful implementation of the proposed study is aimed towards providing cost effective and industrially scalable materials for integrated single molecule electronics beyond the current limits of miniaturization.

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/phd.html>

<http://www.xjtlu.edu.cn/en/admissions/phd/feescholarships.html>

How to Apply:

Interested applicants are advised to email li.yang@xjtlu.edu.cn (principle supervisor's email address) the following documents and copy doctoralstudies@xjtlu.edu.cn (please put the project title 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://www.xjtlu.edu.cn/en/departments/academic-departments/chemistry/staff/li-yang>