XJTLU-XJTU-UoL Joint Doctoral Supervision Project (Full-time)

Reference No.	SFXJTU2504
XJTLU School	School of Robotics
PhD Programme	Chemistry
Supervisors	XJTLU supervisor: Dr Chenguang Liu XJTU supervisor: Professor Xiaogang Han UoL supervisor: Professor Laurence Hardwick
Project Title	Research on high specific energy solid state lithium battery technology 高比能固态锂电池技术研究
Application Deadline	Open until the position is filled

Requirements:

A UK first-class or upper second-class honours Bachelor's degree and a UK Master's degree with Merit (or their equivalent) are required for PhD admissions. Exceptional candidates holding only a Bachelor's degree may be considered on an individual basis.

Evidence of good spoken and written English is essential. The candidate should have an IELTS (or equivalent) score of 6.5 or above, if the first language is not English.

For more information about entry requirements and admission procedures of PhD programme at XJTLU, please visit:

Entry Requirement - Xi'an Jiaotong-Liverpool University

How to Apply - Xi'an Jiaotong-Liverpool University

Other Requirements (if any):

1. The candidate should have a solid academic foundation in chemistry, materials science, energy storage, electrochemistry, or related disciplines, with particular interest in next-generation battery technologies.

2. The candidate should be familiar with organic or inorganic synthesis, surface/interface engineering, or the fabrication and testing of electrochemical devices, especially lithium-based energy storage systems.

3. Familiarity with characterization techniques such as SEM, TEM, XPS, XRD, Raman, or NMR is expected. Experience in interpreting data from these methods to understand material structures and interfaces is desirable.

4. A strong motivation to pursue independent research addressing key scientific and engineering challenges in solid-state lithium battery technology.

5. Strong collaborative and communication skills are essential. The project involves joint supervision across XJTLU, XJTU, and the University of Liverpool, and may include research visits and cross-institutional collaboration.

Programme Structure:

Doctoral students in the joint programme are registered with both XJTLU and the UoL. Upon successful completion of the programme, the students will be awarded a PhD degree from University of Liverpool.

During their doctoral studies at XJTLU, students are expected to conduct research at XJTU as visiting students. Additionally, students have the opportunity to apply for a three to six-month research visit to UoL.

Project Description:

All-solid-state energy storage batteries are a key direction in the development of next-generation energy technologies. They provide critical technical support for achieving the dual-carbon goals, building new power systems, and promoting energy structure transformation. A major limitation of conventional liquid lithium-ion batteries is the risk of leakage and combustion due to flammable organic electrolytes, which frequently leads to safety incidents. Replacing these with non-flammable, leak-proof solid electrolytes significantly enhances battery safety, minimizes fire and explosion risks, and ensures intrinsic safety.

However, several scientific and technical challenges remain for all-solid-state lithium batteries, including: scalable fabrication of solid electrolyte films with high ionic conductivity and electrochemical stability; low-impedance solid–solid interface engineering; development of high specific energy electrode materials suitable for solid-state systems; and integrated cell design and optimization.

This project focuses on addressing these critical issues through the study of high-conductivity solid electrolytes, composite electrolyte films, ultra-thin lithium metal anodes, solid–solid interfacial stability, and advanced structural designs for solid-state batteries. The goal is to establish a theoretical framework for high-performance solid electrolytes, fabricate high-conductivity electrolyte films, resolve interfacial stability problems, develop ultra-thin alloy lithium anodes, and ultimately realize high-energy-density soft-pack solid-state lithium batteries.

The project scope may be adjusted appropriately according to project requirements or research needs.

Joint Supervisory Team:

XJTLU supervisor: Dr Chenguang Liu

XJTU supervisor: Professor Xiaogang Han

UoL supervisor: Professor Laurence Hardwick

How to Apply:

Interested applicants are advised to email Dr Chenguang Liu (chenguang.liu02@xjtlu.edu.cn or Professor Xiaogang Han (xiaogang.han@xjtu.edu.cn) the following documents for initial review and assessment (Please include the project title in the subject line).

- CV
- Two formal reference letters
- Personal statement outlining your interest in the position
- Certificates of English language qualifications (IELTS or equivalent)
- Full academic 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)
- PDF copy of Master Degree dissertation (or an equivalent writing sample) and examiners reports available