

## PhD studentship (Full-time)

Institution	Xi'an Jiaotong-Liverpool University, China
School	Design School
Supervisors	Principal supervisor: Dr Tianhong Gu (XJTLU) Co-supervisor: Prof Konstantinos Papadikis (XJTLU) Co-supervisor: Dr Haifei Zhang (UoL)
Application Deadline	Open until the position is filled
Funding Availability	Funded PhD project (world-wide students)
Project Title	Exploring engineering resilience of Tungsten (W)-based superalloys in extreme environments (Materials Sciences and Engineering Area)
Contact	Please email <a href="mailto:tianhong.Gu@xjtlu.edu.cn">tianhong.Gu@xjtlu.edu.cn</a> (XJTLU principal supervisor's email address) with a subject line of the PhD project title.  The principal supervisor's profile is linked here: <a href="https://www.xjtlu.edu.cn/zh/study/departments/academic-departments/civil-engineering/department-staff/academic-staff/staff/tianhong-gu">https://www.xjtlu.edu.cn/zh/study/departments/academic-departments/civil-engineering/department-staff/academic-staff/staff/tianhong-gu</a>

### **Requirements:**

The candidate should have an undergraduate degree with a first-class or upper second-class honours degree, and/or a master's degree with distinction or merit (or equivalent qualification) in Materials Science and Engineering, Mechanical Engineering or relative fields in Engineering and Science. The candidate is desirable to have a strong background in mechanical testing and microstructure characterisation and be familiar with computational simulation.

Evidence of good spoken and written English is essential. The candidate should have an IELTS score of 6.5 or above 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 99,000 per annum). It also provides up to RMB 16,500 to allow participation at international conferences during the period of the award. 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 up to six months, if this is required by the project.

**Project Description:**

Improved high-temperature materials are needed for nuclear fusion/fission reactors to increase performance, efficiency and safety. These applications require materials with high melting points, strength and creep resistance. The objectives of this research will develop a fundamental understanding of W-based superalloys, which are needed to investigate their engineering resilience to fracture & fatigue damage and creep resistance in extreme environments, to drive forward the development of high-temperature materials. This will provide new mechanistic insights into the thermomechanical performance of superalloys, including understanding at the atomic and microstructural level mechanisms to demonstrate mechanical properties. If realised, W-based superalloys would become a new class of high-temperature material that could allow for a step change in temperature capability. This is critically important to enable nuclear fusion and next-generation IV fission reactors where new materials are needed to increase fuel efficiency, performance, design life and safety. Thus, this study aims to:

- (1) Examine the difference in mechanical properties between pure W and W-based superalloys in extreme environments, so as to conduct a comparison study.
- (2) Investigate the deformation mechanisms present in W and W-based superalloys.
- (3) Characterise the materials to be assessed, using characterisation techniques such as SEM, EDX, XRD and EBSD.
- (4) Establish microstructure-level modelling methods using data from (1) as inputs to clarify the failure mechanisms through further iteration of the material input properties to lead to simulation more closely mirroring the response to be observed experimentally and validated against controlled thermomechanical tests.
- (5) Develop a fundamental understanding of W-based superalloys that are needed for the increased operating temperatures above existing capabilities.

For more information about doctoral scholarship and PhD programme at Xi'an Jiaotong-Liverpool University (XJTLU), please visit

<https://www.xjtlu.edu.cn/en/admissions/global/entry-requirements/>

<https://www.xjtlu.edu.cn/en/admissions/global/fees-and-scholarship>

**How to Apply:**

Interested applicants are advised to email [tianhong.Gu@xjtlu.edu.cn](mailto:tianhong.Gu@xjtlu.edu.cn) the following documents for initial review and assessment (please put 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's Degree dissertation (or an equivalent writing sample) and examiner reports available