

PhD studentship (Full-time)

Institution	Xi'an Jiaotong-Liverpool University, China
School	School of Advanced Technology
Supervisors	Principal supervisor: Professor/Dr Min Chen. (XJTLU) Co-supervisor: Professor/Dr Guohua Fan.....(JITRI) Co-supervisor: Professor/Dr...Maulik Patel..(UoL)
Application Deadline	Open until the position is filled
Funding Availability	Funded PhD project
Project Title	Revealing residual stress formation mechanisms during laser powder bed fusion process through FIB-DIC technology
Contact	Please email Min.Chen@xjtlu.edu.cn (XJTLU principal supervisor's email address) or ghfan@hit.edu.cn (JITRI supervisor's email) 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 Material Science and Engineering or Metallurgy or Mechanical Engineering.

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.

Please note that the joint PhD project is industry-based and the candidate is expected to undertake part of the research at the partner organization in China.

Degree:

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

Funding:

This PhD project is a collaborative research project between XJTLU (<http://www.xjtlu.edu.cn>) in Suzhou and JITRI (Jiangsu Industrial Technology Research Institute) Yangtze Delta Region Institute of Advanced Materials... The student will be registered as an XJTLU PhD student but is expected to carry out the

major part of his or her research at the Institute in Yangtze Delta Region Institute of Advanced Materials.

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). In addition, during the period of undertaking main research at institute in Suzhou, the PhD candidate will be provided with monthly living allowance at a standard 5000 per month by Yangtze Delta Region Institute of Advanced Materials.

Project Description:

Laser powder bed fusion (LPBF), as a burgeoning additive manufacturing (AM) technology, is gaining more and more attention owing to its superior ability to produce high-performance parts with complex geometries. Residual stress is regarded as one of the most important issues in LPBF of metallic components, in which the materials undergo a process of rapid melting and solidification as well as a history of repeated heating and cooling. Due to the limitation of the existing residual stress measurement technology, it is still challenged to accurately measure the residual stress of the LPBF processed parts, especially in the mesoscale (a range of melting pool size). To the best of our knowledge, there is currently no method that can effectively measure the residual stress of the molten pool, resulting in a very limited understanding of the stress formation mechanism and its evolution during the LPBF. Therefore, the aim of this project is to develop an advanced Focused Ion Beam–Digital Image Correlation (FIB-DIC) residual stress technique, which allows for estimating the residual stress of the LPBF-processed parts in macro and mesoscale. Then this advanced technique will be applied to evaluate the local residual stress of the melting pool from single track to multi-tracks and from single layer to multi-layers. With the combination of well-designed experiments and FEA simulation, the formation mechanism of the residual stress during LPBF will be revealed. At last, the relationship between the residual stress formation and the unique microstructure like cell dislocations is also an important research topic of this project.

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

<http://www.xjtlu.edu.cn/en/study-with-us/admissions/entry-requirements>

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

Supervisor Profile:

Principal Supervisor:

Dr. Min Chen, senior associate professor from School of Advanced Technology,

Xi'an Jiaotong-Liverpool University. Dr. Chen received her bachelor and doctor degree in Mechanical Engineering from Southeast University. From 2007 to 2015, she studied and worked in RWTH Aachen, Germany.

Her research focuses on the structure optimization, reliability analysis, computational mechanics and product design. Currently she hosts several governmental research funding and industrial projects related to smart structure and multi-physics coupling analysis.

<https://www.xjtlu.edu.cn/en/departments/academic-departments/school-of-advanced-technology/staff/min-chen>

JITRI co-supervisor:

Prof. Fan Guohua is the Director of the Advanced Electron Microscopy Characterization Platform in Yangtze Delta Region Institute of Advanced Materials. Prof. Fan is also principal in charge of the Key Lab of Advanced Lightweight High-Performance Materials in Nanjing Technology University. He mainly engaged in the research of strengthening and toughening mechanism, component forming and application of configurational metal structural materials. His research work focuses on the inversion of the strength and plasticity/toughness of metal structural materials, studying the strengthening and toughening mechanism of metal structural materials from the perspective of local strain, and realizes the "characterization device and method → Basic theory → key structural material verification". He developed a variety of lightweight materials and components, which is expected to break through the bottleneck of lightweight metal structural materials in important national defense. In the past five years, he has published more than 50 SCI papers in top journals such as Acta Mater. (4 papers), Inter. J. Plasticity (1 paper), Scripta Mater. (6 papers), Metall. Mater. Trans. A (4 papers) etc. with more than 1000 SCI citations. He presided over numbers of research projects including the National Major Scientific Research Instrument Research and Development Project, the General and Youth Project of the National Natural Science Foundation of China, the National Defense Science and Technology Commission Innovation Special Zone Project, and the Aerospace Science and Industry Group Horizontal Project.

<https://www.scopus.com/authid/detail.uri?authorId=26640367100>

UoL co-supervisor:

Dr Maulik Patel, Reader in Nuclear Materials Science, University of Liverpool. His research interest lies in materials for nuclear, renewable energy and advanced manufacturing. Dr. Patel use various types of radiation to understand the influence of atomic level defects on material performance.

<https://www.liverpool.ac.uk/engineering/staff/maulik-patel/>

How to Apply:

Interested applicants are advised to email Min.Chen@xjtlu.edu.cn (XJTLU principal supervisor's email address) or ghfan@hit.edu.cn (JITRI supervisor's email) the following documents for initial review and assessment (please put the project title in the subject line).

- CV
- Two reference letters with company/university letterhead
- Personal statement outlining your interest in the position
- Proof of English language proficiency (an IELTS score of 6.5 or above)
- 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)
- PDF copy of Master Degree dissertation (or an equivalent writing sample) and examiners reports available