PhD studentship (Full-time)

Institution	Xi'an Jiaotong-Liverpool University, China
School	School of Science, Department of Chemistry
Supervisors	Principal supervisor: Dr Xuan Xue (XJTLU) Co-supervisor: Professor Yuwen Cui (JITRI) Co-supervisor: Dr. Konstantin Luzyanin (UoL)
Application Deadline	Open until the position is filled
Funding Availability	Funded PhD project
Project Title	Machine Learning in Predicting Printability and Shape Fidelity of Bioink for 3D Bio-printed Organoids
Contact	Please email xuan.xue@xjtlu.edu.cn (XJTLU principal supervisor's email address) or ycui@njtech.edu.cn (JITRI supervisor's email) with a subject line of the PhD project title

Requirements:

The candidate should have a double bachelor's or a master's degree (or equivalent qualification) in chemistry, information or computer science, material science or pharmaceutics. A sound knowledge of linear algebra, statistics, numerical analysis, and machine learning is essential. Skills in at least one programming language (Python, Matlab, C++, etc) are desirable.

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 Institution 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 99,000 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 RMB 2500 -3000 per month by Yangtze Delta Region Institution of Advanced Materials. In addition, accommodation is also provided in Xiangcheng District, Suzhou.

Project Description:

On the basis of ongoing R&D database of 3D-bioprinted organoids and organoids-on-chip, the project aims to discern the quantitative features and develop machine learning models featured by the rheological properties and filament formation for then extrudability of bioinks in extrusion-based 3D bioprinting. It is further incorporated with multifidelity data fusion technique to create "green" artificial intelligence (AI) prototype for shape fidelity and printability prediction of 3D bioprinting, which can ultimately promote the engineering application of organoid bioprinting.

The objectives of this PhD project include:

1)   Based on the R&D database for bioink fabrication and organoid bioprinting, collect, classify and preprocess multi-fidelity datasets;

2)   Aiming at extrusion-based 3D bioprinting of organoid, investigate the chemical composition and rheological properties of biomaterials and bioinks, the specification of printer and the parameters of printing process, and explore the quantitative governing feature for extrudability by featuring engineering, and develop a machine learning model for the prediction of extrudability;

3)   Investigate the filament formation and shape fidelity of 3D bioprinting, elucidate the quantitative features that rules the printability by unveiling the influence of the geometry and stability of filament on shape fidelity, and develop machine learning models for printability and shape fidelity;

4)   With the multi-fidelity data fusion technology as the core, process, feature and fuse the observation and simulation datasets with different cost, volume and fidelity, and develop the machine learning model and prediction technology with small and medium-sized datasets.

5)   Framework the AI-based prediction and design prototype for bioink and 3D bio-printing of colorectal organoid.

By constructing bioink R&D data assets and developing AI design prototype

technology, it can provide AI and guiding support for 3D bioprinting of organoids constructs and smart manufacturing, effectively reduce R&D costs, yet has important application value and transfer of organoids, multifluidic chip and 3D bioprinting and their interdisciplinary technologies to R&D institutions and hospitals.

For more information about doctoral scholarship and PhD programme 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. Xuan Xue is currently an Assistant Professor in the Department of Chemistry at Xi'an jiaotong-Liverpool University, Suzhou, China. She received her Ph.D. degree from the University of Nottingham (UK) with full Oversea Research Scholarship. After her Ph.D., she has achieved valuable experience in both academia and industry R&D. Her research interests cover a wide range of interdisciplinary research areas from materials science, polymer chemistry, surface chemistry, 3D-bioprinting to tissue engineering, cell biology and microbiology.

More details can be found on the webpage:
https://www.xjtlu.edu.cn/zh/departments/academic-departments/chemistry/staff/xuan-xue

JITRI co-supervisor:

Prof. Yuwen Cui is currently professor and vice director of New Materials Institute at the Nanjing Tech University. He is also the scientific head of AI-based Materials Design Platform at the Yangtze Delta Region Institute of Advanced Materials. He received his Ph.D. degree from Central South University (Changsha, China), and has two decades of research experience from world-famous materials institutions prior to returning to China. His research focuses in the fields of integrated computational materials engineering (ICME), AI-based material design, high throughput characterization of micro-nano mechanical properties, and mesoscale modeling of microstructure.

More details can be found on the webpage:
http://cly.njtech.edu.cn/info/1039/5307.htm

How to Apply:
Interested applicants are advised to email xuan.xue@xjtlu.edu.cn (XJTLU principal supervisor's email address) or ycui@njtech.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