Project Reference: CTE\_ EMERC\_Tariq\_002\_25\_26

## About the Project

This is an exciting PhD opportunity within the College of Technology and Environment (CTE) at London South Bank University (LSBU). The successful candidate will receive a tuition fee waiver beginning in September 2025 for 4 years, including the write-up year.

## Project Title

Advancing the sustainability and reliability of photo-assisted rechargeable batteries

## **Project Overview**

Batteries capable of direct recharging through light could provide an effective solution to the growing demand for sustainable energy. However, most existing photo-rechargeable batteries face significant technical challenges, including poor cyclic performance, low energy density, short lifespan, and high manufacturing and recyclability costs. Moreover, the extraction of essential minerals is resource-intensive and environmentally damaging, contributing to greenhouse gas emissions, water pollution, and deforestation. There is an urgent need for innovative solutions to elevate battery performance, improve lifespan, circularity and recyclability, and mitigate environmental impact.

The project aims to develop better, more sustainable photo-rechargeable batteries. This will be achieved by first deepening real-time understanding of degradation mechanisms via operando microscopy, followed by the development of novel, sustainable, advanced photoelectrode materials using innovative manufacturing techniques. This is a continuation of our recent work, which was published in Advanced Functional Materials and filed for patent protection (GB2503090.9).

# Who Are We Looking For?

- Open to any UK or international candidates. Starting in September 2025.
- The candidate must meet the minimum entry requirements for our PhD programme by clicking the '<u>Apply</u>' link.
- Previous relevant research experience in battery or energy storage materials and battery fabrication is desirable.
- The candidate should be highly motivated, possess strong collaboration skills, and have excellent oral and written communication skills.

### **Selection Criteria:**

- Academic Qualifications You should normally have at least a 2.1 honours degree from a UK University or an equivalent qualification in engineering, computer science, etc.
- Research and Analytical Skills Ability to research subjects using libraries, the internet, and other information resources, ability to conduct comprehensive literature reviews, experience in qualitative and quantitative data collection and analysis, strong research design and methodology skills, ability to independently collaborate with stakeholders, and excellent academic writing and communication skills.
- Professional Skills Project management and organisational skills, ability to work independently and as part of a team, problem-solving and critical thinking skills, and adaptability and willingness to learn new skills.
- Software and Modelling Experience Experience developing and utilising spreadsheet-based models (e.g., Microsoft Excel) to an advanced level. Experience with other software packages relevant to the discipline would be an advantage.

- Communication Skills—The candidate should be highly motivated, able to collaborate, have good visual, oral, and written communication skills, and communicate the work's outcomes to commercial, industrial, and scientific audiences.
- Teamwork and Collaboration Ability to work with industrial and academic supervisors.
- Language Proficiency Overseas applicants must have a minimum English language IELTS score of 6.5, with at least 5.5 in any of the components.
- Understanding of Equality and Diversity Able to demonstrate an understanding of equality and diversity and their practical applications.
- Visa and Legal Requirements Non-EU/EEA nationals may need to apply to the Foreign and Commonwealth Office (FCO) for clearance from the Academic Technology Approval Scheme (ATAS).

# **Training & Development Opportunities**

Doctoral students at London South Bank University (LSBU), through the London Doctoral College (LDC), benefit from a rich and structured training environment designed to support academic excellence and professional development. All PhD candidates are offered a comprehensive programme of workshops and seminars covering essential research skills, including research design, data analysis, academic writing, ethics, and project management. These sessions aim to support students through every stage of their doctoral journey—from literature review and methodology to thesis completion and viva preparation. Postgraduate researchers can access advanced, discipline-specific training aligned with their research focus. LSBU's doctoral training environment is designed to build deep expertise in a chosen research area and the broader skills necessary for successful careers in research, industry, and beyond.

## About the College

The College of Technology and Environment (CTE) at London South Bank University (LSBU) is a newly formed academic college, launched in January following the university's recent reorganisation. Led by Executive Dean Professor Chris Harty, CTE brings together four schools: Architecture & Planning, Construction, Property & Surveying, Engineering & Design, and Computer Science & Digital Technologies. The college fosters a collaborative and interdisciplinary environment, addressing the complex challenges of the built and digital environments. CTE strongly emphasises research, with doctoral students playing a key role in shaping and contributing to the college's research agenda. CTE prepares students to become future leaders through innovation, industry partnerships, and a commitment to sustainability. With a focus on real-world impact and academic excellence, the college is set to drive forward LSBU's vision of delivering applied knowledge that transforms lives and communities locally and globally. The university has five centres, and any academic staff and students in the college can join. These research centres are described below.

### About the Energy, Materials and Environment (EME) Research Centre

The <u>Energy</u>, <u>Materials and Environment Research Centre</u> leads interdisciplinary research on sustainable energy systems and material innovation. We address climate change by developing whole energy systems, spanning generation, storage, distribution, and consumption. Our research draws from materials engineering, policy, and societal impact to understand and influence the complex relationships between energy, economy, and society. With expertise in multiscale systems and cross-sector collaboration, we aim to shape policy and technology that supports the transition to a low-carbon future. Our work informs sustainable development strategies that balance environmental, economic, and social needs across local and global contexts.

### **Contact Person**

Before applying, please contact the main supervisor, **Dr Tariq Sajjad**, Associate Professor of Energy Engineering and Materials Devices at the School of Engineering and Design, College of Technology and Environment.

E-mail: sajjadt@lsbu.ac.uk Phone:

In your email, include:

- Details of your current level of study and academic background.
- A summary of any relevant experience.
- A brief paragraph about your motivation for pursuing this PhD project.

### Fee Waiver

The fee waiver is available for 4 years (48 months), including the writing-up year, examination period, and submission of the corrected thesis.

### How to apply

Applications should be submitted via the programme page using the links below:

https://www.lsbu.ac.uk/study/course-finder/general-engineering-phd

You should upload the problem statement, qualifications, CV, and other relevant documentation to the application portal. Remember to state the correct reference number and the appropriate supervisor.