



JOB DESCRIPTION

Research Centre	School of Biotechnology
Post title	Postdoctoral Researcher Bioprocessing
Level on Framework	Level 1
Post duration	11 months Fixed Term contract (potential for extension)

Dublin City University

Dublin City University www.DCU.ie is a young, ambitious and vibrant University, with a mission 'to transform lives and societies through education, research, innovation and engagement'. Known as Ireland's 'University of Enterprise and Transformation', it is committed to the development of talent, and the discovery and translation of knowledge that advances society and the economy. DCU is the Sunday Times Irish University of the Year 2021.

The University is based on three academic campuses in the Glasnevin-Drumcondra region of north Dublin. It currently has more than 18,000 students enrolled across five faculties – Science and Health, DCU Business School, Computing and Engineering, Humanities and Social Sciences and DCU Institute of Education. DCU is committed to excellence across all its activities. This is demonstrated by its world-class research initiatives, its cutting-edge approach to teaching and learning, its focus on creating a transformative student experience, and its positive social and economic impact. This exceptional commitment on the part of its staff and students has led to DCU's ranking among the top 2% of universities globally. It also consistently features in the world's Top 100 Young Universities (currently in QS Top 70 Under 50, Times Higher Top 150 Under 100).

DCU is placed 84th in the world, in the Times Higher Education University Impact Rankings – measuring higher education institutions' contributions towards the UN Sustainable Development Goals. Over the past decade, DCU has also been the leading Irish university in the area of technology transfer, as reflected by licensing of intellectual property.

As part of this role the researcher will be required to participate in the DCU Research Career Framework. This framework is designed to provide significant professional development opportunities to Researchers and offer the best opportunities in terms of a wider career path.

Background & Role

A postdoctoral position is available in the School of Biotechnology at Dublin City University (DCU) to undertake research on the following project: "Developing an economically viable dark fermentation process for biohydrogen production from Irish whiskey distillery and dairy industry wastes (EcoDF)". This postdoctoral position is funded through a Sustainable Energy Authority of Ireland award. This project involves a high level of industry engagement particularly with Irish Whiskey Distillery and Dairy industries in forms of sample collection and research meetings on a regular basis.

In the process of dark fermentation, complex organic matter is broken down to their monomer at hydrolysis step, to be further converted to volatile fatty acids in acetogenesis step. The anaerobic microbes, namely *Enterobacter spp.*, *Clostridium spp.*, *Bacillus spp.* or *Ruminococcus spp.* are then ferments the intermediate substrates into biohydrogen in the absence of light at ambient temperature. It's considered to be the most advantageous sustainable energy production process as the 3-fold higher calorific value of biohydrogen (142 Mj/kg) in comparison to biomethane (50 – 55 Mj/kg). Owing to its high energy value, biohydrogen has an indicative price range of €0.9 – 7.3 per kg while it is only €0.4 – 0.7 per kg for biomethane. Moreover, the current biohydrogen global market size is €124.4 billion with an estimation to reach €183.4 billion by 2025 while the estimated market size for biomethane is only €2.4 billion. The financial potential and the clean nature of biohydrogen renders it a “fuel of the future”.

This project aims to develop economic solutions for widespread adoption of dark fermentation using pot ale, draff and cheese whey and dairy wastewater from Irish whiskey and dairy industries for biohydrogen production. In this regard the project aims to create a comprehensive overview by maximising the biohydrogen yield of the forementioned substrates, to guiding the full-scale applications in terms of energy recovery and environmental standpoints in transitioning to a low carbon economy. The ultimate goal of this project is to initiate an economically viable future best practise by

(i) optimising biodegradation efficiency of the wastes and microbial activity of inoculum will be enhanced by novel pre-treatments,

(ii) modelling and optimising the operational parameters via Design Expert Software prior to scale up

(iii) assessing techno-economic analysis and environmental benefits of potential future industrial dark fermentation pathways

The project will be supervised by Assistant Professor Burcu Gunes in Bioprocess Engineering in the School of Biotechnology, Dublin City University.

Principal Duties and Responsibilities

Reporting to his/her Principal Investigator the Postdoctoral Researcher will:

- Engage with the existing industrial partners and establish new connection in consultation with Dr Burcu Gunes.
- Carry out all experimental objectives as specified in the project.
- Document all experimental data, analyses and protocols.
- Report/present regularly at group meetings.
- Attend relevant meetings, seminars and conferences.
- Contribute to manuscript preparation and patent applications relevant to the project.
- Complete a detailed report upon completion of the project.
- Undertake standard laboratory management tasks.
- Support and interact with the existing Gunes Group in the School of Biotechnology.
- Undertake other tasks as defined by the Dr. Burcu Gunes

Minimum Criteria

Applicants should have a PhD in Bioprocess Engineering, Chemical Engineering, Biotechnology, Microbiology with relevant experience and an understanding of the “biomass to bioenergy” conversion technologies

- Is highly motivated and passionate about sustainability and climate change research
- Has evidence of strong technical skills in handling single and/or mixed bacterial cultures, microbial fermentation, process design and scale-up as evidenced by peer reviewed original and review publications.
- Demonstrates a track record of strong research experience in the development and application of analytical assays for characterisation of the organic wastes (substrate) as well as quantitative analysis of hydrogen.
- Has experience in process techno-economic evaluation and/or lifecycle assessment.
- Has a significant publication record of relevance to the project, have excellent data analysis, communication and organisational skills.
- Demonstrates experience of statistical software for mathematical modelling and process optimisation
- Has experience in supervision and mentoring of undergraduate and postgraduate
- Has a track record of problem solving experience in a research laboratory environment.
- Has experience of participation in successful inter-disciplinary research programmes.
- Has the ability to communicate effectively and has excellent social skills.

Essential Training

The post holder will be required to undertake the following essential compliance training: Orientation, Health and Safety and Intellectual Property and Data Protection training. Other training may need to be undertaken when required.