Department of Chemistry
School of Science

Loughborough University

# Research Associate in Bio-engineering

## Job Ref: REQ240657

**As part of the University's ongoing commitment to redeployment, please note that this vacancy may be withdrawn at any stage of the recruitment process if a suitable redeployee is identified.**

## Project Description

As part of a H2020 EU-funded Future Emerging Technologies project grant entitled "Neuronal networks from cortical human iPSCs for Machine Learning Processing (NeuChiP)" (www.neuchip.eu) we are seeking to appoint a postdoctoral research associate. This post is held at Loughborough University, working closely with the consortium to focus on the microfabrication of a device to house, spatially connect, stimulate and characterise living neurons. This device will enable directed connection of a neuronal network derived from human induced pluripotent stem cells (hiPSCs), being genetically modified to enable light stimulation. Embedded multi-electro array (CMOS MEA) technology(3Brain) will also enable direct electrophysiological measurement across the network, with the aim being to carry out biologically-inspired machine learning using living neural networks. The post is suitable for those having expertise within the areas of micro-manufacture (lithography, 3D printing and associated techniques), neural engineering and biomaterials fabrication. Training will be provided where appropriate on specialist instrumentation and for specific methodologies.

The PDRA will be join the Department of Chemistry within the School of Science at Loughborough University within Prof Paul Roach and Dr Eric Hill's research groups, a highly dynamic and multidisciplinary environment being supported by state-of-the-art facilities. The group has a strong background in biomaterials development and micro-fabrication for the support of neural cell culture systems. This research project sits at the interface between many disciplines, and is part of a team within and external to Loughborough. As such, the successful applicant will need to be proactive and dynamic to work in response to many other elements within the overall project.

The NEU-CHiP project involves partner institutions in the UK, France, Spain, Switzerland and Israel. The PDRA will have a focus on development of a platform technology bringing areas of micro-fabrication together with neuronal cell culture, working with stem cell biologists, physicists, mathematicians, and neuromorphic computing experts across the project team.

## Job Description

**Job Grade:** Specialist and Supporting Academic Grade 6

**Job Purpose**

To conduct cross-disciplinary research in the areas of bioengineering and microfabrication, within the remit of the H2020 EU-funded NEU-Chip project. To be responsible for development of a living neural cell network platform which collates a number of technologies into a single device. To work within a multidisciplinary team to develop devices and methodologies as part of this project. To optimise materials and device designs based on primary data collection, incorporate aspects from across the team and to input theoretically and practically into other parts of the overall project where appropriate.

**Job Duties**

- To generate ideas and translate these into physical devices in-line with the project remit.
- To evaluate and optimise methods for device fabrication and construction of multiple elements, to include but not be limited to photolithography and various 3D printing methods.
- To support the development of new cell culture protocols to seed within microdevices, maintain culture and direct differentiation of human iPSCs.
- To characterise and optimise devices and cell culture networks with regards to device design and surface structure and chemical modifications.
- To investigate and incorporate state-of-the-art technologies to enable optogenetic control over cells, as well as conduct experiments using multielectrode arrays (linked with 3Brain).
- To plan forward and work collectively with a team towards the implementation of the living neural network for machine learning purposes.
- Be responsible for conducting the day-to-day running of the project.
- To formulate detailed plans for the project based on broad guidance from the project team.
- To feed back to the project team on progress, to make recommendations for next steps.
- Write up regular progress reports and present outcomes to all Investigators and Collaborators.
- Travel to attend meetings and make presentations both within the project partners working group and to external stakeholders.
- To support the project team by enhancing relationships with existing collaborators and by assisting the establishment of relationships with new collaborators.
- To write, and contribute to, research papers suitable for publication in high quality academic journals.
- To attend and contribute to conferences.
- To contribute to project promotion and public engagement events.
- Contribute ideas for new research and enterprise directions.
- Maintain confidentiality at all times and ensure that intellectual property (IPR) agreements are not violated.
- To assist the academic staff in the project team with the supervision of undergraduate MSc and PhD project work and day-today supervision and support of other researchers.
- Where appropriate, to deliver teaching, tutorial and laboratory sessions to students.
- Engage in training programmes in the University (or elsewhere) that are consistent with the needs and aspirations of the project and those of the Department.
- Undertake other duties as may be reasonably requested and that are commensurate with the nature and grade of the post.

**Points To Note**

The purpose of this job description is to indicate the general level of duties and responsibility of the post. The detailed duties may vary from time to time without changing the general character or level of responsibility entailed.

**Special Conditions**

All staff have a statutory responsibility to take reasonable care of themselves, others and the environment and to prevent harm by their acts or omissions. All staff are therefore required to adhere to the University's Health, Safety and Environmental Policy & Procedures.

All staff should hold a duty and commitment to observing the University's Equality & Diversity policy and procedures at all times. Duties must be carried out in accordance with relevant Equality & Diversity legislation and University policies/procedures.

Successful completion of probation will be dependent on attendance at the University's mandatory courses which include Respecting Diversity and, where appropriate, Recruitment and Selection.

**Organisational Responsibility**

Reports to Professor Paul Roach, Research Group Lead

## Person Specification

Your application will be reviewed with respect to meeting the essential and desirable criteria listed below. Your application will be reviewed against the essential and desirable criteria listed below. Applicants are strongly advised to explicitly state and evidence how they meet each of the essential (and desirable) criteria in their application. Stages of assessment are as follows:

1 – Application
2 – Test/Assessment Centre/Presentation
3 – Interview

**Essential Criteria**

| Area | Criteria | Stage |
|---|---|---|
| Experience | Background in biomaterials/ micro-fabrication | 1 |
| | *In vitro* stem cell culture, differentiation and characterisation | 1, 3 |
| | (Bio)materials fabrication, characterisation and testing | 1, 3 |
| | Micro-fabrication (including but not limited to lithographic techniques and 3D printing) | 1, 3 |
| | Authoring original work for academic journal papers, conference papers or technical reports | 1, 3 |
| Skills and abilities | Standard materials characterisation methods (e.g. wettability, microscopy, SEM, FTIR, AFM) | 1, 3 |
| | Working knowledge of biological assays including microscopy, immunofluorescence, electrophysiological investigation | 1, 3 |
| | Excellent written and oral communication skills | 1, 3 |
| | Self-motivated with ability to meet deadlines | 1, 3 |
| | Excellent interpersonal, and organisational skills | 1, 3 |
| | CAD software, additive manufacturing techniques | 1, 3 |
| | Working knowledge of data presentation and analysis software packages (e.g. Microsoft 365, Origin) | 1, 3 |
| | Ability to write project reports and make technical presentations to industrial and academic research groups | 1, 3 |
| | Knowledge of relevant health & safety issues | 1, 3 |
| Training | Willingness to learn and develop | 3 |
| | Ability to share responsibility for the supervision and training of post-graduate and undergraduate research students | 1, 3 |
| Qualifications | PhD in a relevant subject such as biomaterials, regenerative medicine, engineering (materials, mechanical or electronic), biophysics | 1 |
| Other | Commitment to observing the University's Equal Opportunities policy at all times. | 3 |

**Desirable Criteria**

| Area | Criteria | Stage |
|---|---|---|
| Experience | Experience/ training in instrumentation development | 1, 3 |
| | Multielectrode array technology and neuronal cell interfaces | 1, 3 |

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|---|---|---|
| | Establishing new methodologies for *in vitro* stem cell culture, organoids | 1, 3 |
| | Developing proposals for funding from external agencies | 1, 3 |
| | Light-based 3D printing techniques e.g., 2-Photon Polymerisation, Digital light processor. | |
| | Working in a high quality academic research environment | 1, 3 |
| | Experience of teaching and / or supervision of students in relevant areas | 1, 3 |
| Skills and abilities | Authoring original work, in the highest quality refereed academic journals | 1, 3 |
| | A strong publication track record | 1, 3 |
| | Programming languages such as Matlab, python | 1, 3 |
| Qualifications | PhD (or relevant other qualification/experience) in an area of micro-fabrication, biomaterials for the development of cell culture devices | 1, 3 |

## Conditions of Service

The position is FULL TIME and FIXED TERM until 28 February 2025. Salary will be on Specialist and Supporting Academic Grade 6 (£33,966 – £44,263 per annum), at a starting salary to be confirmed on offer of appointment. The appointment will be subject to the University's Terms and Conditions of Employment for STAFF GRADES 6 AND ABOVE, details of which can be found here.

The University is committed to enabling staff to maintain a healthy work-home balance and has a number of family-friendly policies which can be found here.

The University offers a wide range of employee benefits which can be found here.

We also offer an on-campus nursery with subsidised places, subsidised places at local holiday clubs and a childcare voucher scheme (further details are available at: http://www.lboro.ac.uk/services/hr/a-z/childcare-information---page.html

In addition, the University is supportive, wherever possible, of flexible working arrangements.
We also strive to create a culture that supports equality and celebrates diversity throughout the campus. The University holds a Bronze Athena SWAN award which recognises the importance of support for women at all stages of their academic career. For further information on Athena SWAN see http://www.lboro.ac.uk/services/hr/athena-swan/