Department of Chemistry/School of Science

# Research Associate in Gene Delivery and Cell Biology

## Job Ref: REQ250515

***Department of Chemistry***

### Project Description

We invite applications for an 18-month postdoctoral research associate position in gene delivery and cell biology. This multi-disciplinary Academy of Medical Sciences Springboard project, led by Dr. Amanda Pearce at Loughborough University, aims to develop polymer vesicles for site-specific delivery of CRISPR/Cas9 to the brain as a novel therapy for Alzheimer's Disease (AD).

The successful candidate will join a collaborative team with expertise in synthetic organic chemistry, polymer chemistry, nanoparticle formulation, biochemistry and cell biology. The objectives are to screen polymer vesicle formulations to determine optimum chemistries for high encapsulation and stability of CRISPR/Cas9 gene editing constructs. A variety of 2D and 3D cell culture assays will be employed (including an in vitro blood-brain barrier model in collaboration with the University of Manchester) to determine hit formulations with selective localisation within diseased brain cells.

Building on our recent development of polymer vesicles for the encapsulation of macromolecular chemosensors, the project aims to:

- Generate a CRISPR/Cas9 system targeting enhanced green fluorescence protein (GFP)
- Encapsulate this construct within a library of polymer vesicles
- Assess encapsulation and stability using a range of biochemistry assays, and cell uptake in iPSC neurons and astrocytes with AD-specific mutations
- Analyse chemical and biological experimental data to generate structure-property relationships guiding further targeted vesicle development
- Evaluate ability for hit vesicle formulations to cross the blood-brain barrier in a transwell model using iPSC-derived neurovascular cells

The position is ideally suited for an ambitious early career researcher with a strong background in biochemistry and/or cell biology assays. You will be proficient in mammalian cell culture and microscopy and comfortable in performing experiments in controlled/sterile conditions. Experience with DNA/RNA, gel electrophoresis, protein expression and particle sizing techniques is advantageous. The successful candidate will be motivated to advance novel polymer CRISPR/Cas9 delivery vehicles, collaborating with a skilled team to progress research in AD treatments.

This is a full-time 18-month position to commence on or after 6th October 2025.

For relevant publications please see: *Macromolecules,* **2024**, 57, 4062-4071; *Adv. Healthc. Mater.*, **2020**, 9, 2000892; *Bioconj. Chem.*, **2019**, 30, 2300–2311.
More information about the Pearce Group can be found here: https://www.pearcepolymergroup.com/
For further details contact Dr Amanda Pearce at a.pearce@lboro.ac.uk

### Job Description

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

**Job Purpose:** This AMS Springboard project focuses on the development of a library of polymer vesicles with site-specific delivery of CRISPR/Cas9 to the brain as a novel therapy for Alzheimer's Disease. The project will involve chemical design and synthesis of the nanoparticle carriers, analysis of their cell behaviour and ability to encapsulate gene editing constructs, and evaluation of their ability to cross the blood-brain barrier in a cell culture model.

**Job Duties**

**RESEARCH AND SCHOLARSHIP**

- Prepare and characterise CRISPR/Cas9 gene editing constructs through the ribonucleoprotein (RNP) approach and assess encapsulation within polymer vesicles.
- Carry out in vitro cytotoxicity assays of polymer vesicles, study their internalisation using plate reader and microscopy assays, and analyse knockdown efficiency of model CRISPR/Cas9 RNPs.
- Learn the production of an in vitro blood-brain barrier model (in collaboration with the University of Manchester) and study transport of polymer vesicles in this model.
- Plan and manage research activities to meet objectives and deadlines, keeping accurate scientific records.
- Lead discussions and provide regular research updates to the PI, and during wider research group meetings.
- Contribute to the preparation of research articles.
- Engage in project promotion and engagement activities.
- Build external contacts and participate in knowledge exchange to strengthen relationships for future collaboration.
- Assist in preparing research proposals and applications for external funding.

**TEACHING AND LEARNING**

- Assist in supervising undergraduate and postgraduate research projects within the Pearce research group.
- Engage in training programmes through staff development consistent with your aspirations and that of the project.

**OTHER ACTIVITIES**

- Assist with the management and smooth operation of equipment and instrumentation within the research group.
- Undertake other duties that may be reasonably requested and 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 Equity & Diversity policy and procedures at all times. Duties must be carried out in accordance with relevant Equity & Diversity legislation and University policies/procedures.

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

**Organisational Responsibility**

Reports to Dr Amanda Pearce, Lecturer in Chemistry.

## Person Specification

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 and Knowledge | Relevant postgraduate or industrial experience in cell culture experiments | 1 |
| | Research experience with sufficient depth of specialist knowledge in the discipline | 1,3 |
| | Preparation of research publications and/or patents | 1,3 |
| | Advance knowledge of the research methods and techniques to work effectively within the research project | 1,3 |
| | Experience in supervision of postgraduate or undergraduate project students in the laboratory | 1,3 |
| Skills and Abilities | Ability to work effectively in a wider team with strong interpersonal skills | 1,3 |
| | Ability to organise time and plan effectively to meet deadlines | 1 |
| | Excellent written and oral communication skills | 1,3 |
| | Ability to deliver oral presentations, write research reports and produce draft publications | 1,3 |
| | Ability to share responsibility for the supervision and training of undergraduate and postgraduate students in the laboratory | 1,3 |
| Training | Willingness to travel to collaborators to undertake appropriate training in techniques and instrumentation | 1,3 |
| | Willingness to undertake appropriate further training (e.g. IP protection) | 1,3 |
| Qualifications | Holds (or is about to obtain) a PhD in Biological Sciences, Biochemistry, Biotechnology or related | 1 |

**Desirable Criteria**

| Area | Criteria | Stage |
|---|---|---|
| Experience | Experience collaborating with academic and/or industrial partners | 1,3 |
| | Experience in cytotoxicity and cell uptake assays of nanoparticles | 1,3 |
| | Experience working with DNA/RNA and gel electrophoresis | 1 |
| | Experience in protein expression in bacteria | 1,3 |
| | Experience in nanoparticle sizing | 1 |
| | Experience in 3D cell culture models | 1,3 |

## Conditions of Service

The position is **full-time** and **fixed term** for a period of 18 months. Salary will be on research grade 6 (£35,116-£45,413 per annum), at a starting salary to be confirmed on offer of appointment.
The appointment will be subject to the University's normal Terms and Conditions of Employment for Academic and Related staff, 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 are available at http://www.lboro.ac.uk/services/hr/a-z/family-leave-policy-and-procedure---page.html.
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/

## Informal Enquiries

Informal enquiries should be made to Dr Amanda Pearce by email at a.pearce@lboro.ac.uk.