

Job title:	Post Doctoral Research Associate
Job reference number:	1171994
Grade:	UCL Grade 7 Salary Range: £28,983 - £35,646 (excluding London Allowance of £2,795)
Terms and Conditions:	In accordance with the conditions of employment as laid down in the relevant UCL Staff policies
Reporting to:	Dr. Guillaume Charras

Background to the Position:

The aim of the project is to study pressure propagation within living cells using patch clamp electrophysiology, molecular biology and confocal microscopy. One of the most striking features of eukaryotic cells is their capacity to change shape in response to environmental or intrinsic cues thanks to their actomyosin cytoskeleton. In studies of cellular morphogenesis, the cytoplasm is generally viewed as an innocuous backdrop enabling diffusion of signalling proteins. This view misses a major point: the time-dependent mechanical properties of cells are mainly determined by their cytoplasm because it forms the largest part of the cell by volume. We have previously shown that the cytoplasm is akin a fluid-filled sponge and the aim of this project will be to further explore and characterise the physical properties of the cytoplasm. The aim of this project will be to directly assess pressure diffusion within cells. First, we will disrupt pressure distribution in cells extending pressure-driven protrusions (blebs) and ask whether this impedes bleb expansion. Second, we will impose a pressure transient via whole-cell patch clamp in HeLa cells and image pressure diffusion using fluorescence defocusing microscopy. Another aim will be to map the spatial distribution of pore sizes throughout the cell using changes in quantum dot mobility in response to dehydration. The candidate will have the opportunity to work collaboratively with colleagues within LCN, UCL, and Harvard University.

Summary of Job Function:

The Postholder will be required to carry out experimental research into pressure diffusion within the cytoplasm using techniques including, but not limited to, patch-clamp electrophysiology, molecular biology, and microscopy. The candidate will also be required to analyse the experimental data and if need be write short Matlab analysis programs.

The successful candidate will have a PhD in a relevant area of biophysics, or cell and molecular biology. Extensive in electrophysiology, molecular biology, and confocal microscopy is essential. Additional experience in cell biophysics, finite element modelling, and programming will be an advantage.

Duties and Responsibilities

- To optimise means of generating controlled pressure transients within cells.
- To optimise defocusing microscopy techniques for use in the experiments.
- To generate the necessary recombinant DNA constructs for pore size mapping.
- To generate stable cell lines expressing fluorescent protein oligomers.
- To perform whole-cell patch clamp experiments to disrupt pressure distribution in cells.
- To program analysis software for interpretation of experimental data.
- To contribute to the drafting and submitting of papers to peer reviewed journals.
- To prepare progress reports on research for funding bodies as required.
- To contribute to the preparation and drafting of research bids and proposals.
- To contribute to the overall activities of the research team and department as required.
- To contribute to the induction and direction of other research staff and students as requested.
- Responsible for ensuring that equipment is safe and maintained in working order.
- As duties and responsibilities change, the job description will be reviewed and amended in consultation with the postholder.
- The postholder will carry out any other duties as are within the scope, spirit and purpose of the job as requested by Dr Guillaume Charras.
- The postholder will actively follow UCL policies including Equal Opportunities and Race Equality policies.
- The postholder will maintain an awareness and observation of Fire and Health & Safety Regulations.

PERSON SPECIFICATION

Essential

- PhD Degree in a relevant area of biophysics, or cell and molecular biology.
- Experience in patch clamp electrophysiology and molecular Biology.
- Experience of multi-disciplinary working
- Experience with microscopy and image analysis
- Ability to analyse and write up data
- Excellent written and verbal communication skills
- Demonstrated experimental skills
- Ability to work collaboratively and as part of a team

Desirable

- Experience in cell biophysics, finite element modelling, and programming

London Centre for Nanotechnology

The London Centre for Nanotechnology is an interdisciplinary joint enterprise between University College London and Imperial College London. In bringing together world-class infrastructure and leading nanotechnology research activities, the Centre aims to attain the critical mass to compete with the best facilities abroad. Research programmes are aligned to three key areas, namely Planet Care, Healthcare and Information Technology and bridge together biomedical, physical and engineering sciences.

The Centre occupies a purpose-built eight storey facility in Gordon Street, Bloomsbury, as well as extensive facilities within different departments at South Kensington. LCN researchers have access to state-of-the-art clean-room, characterisation, fabrication, manipulation and design laboratories. This experimental research is complemented by leading edge modelling, visualisation and theory.

LCN has strong relationships with the broader nanotechnology and commercial communities, and is involved in many major collaborations. As the

worlds only such facility to be located in the heart of a metropolis LCN has superb access to corporate, investment and industrial partners. LCN is at the forefront of training in nanotechnology, and has a strong media presence aimed at educating the public and bringing transparency to this emerging science.

About UCL

Founded in 1826, UCL was the first English university established after Oxford and Cambridge, the first to admit students regardless of race, class, religion or gender, and the first to provide systematic teaching of law, architecture and medicine. In the government's most recent Research Assessment Exercise, 59 UCL departments achieved top ratings of 5* and 5, indicating research quality of international excellence. UCL is in the top ten world universities in the 2007 THES-QS World University Rankings, and the fourth-ranked UK university in the 2007 league table of the top 500 world universities produced by the Shanghai Jiao Tong University. UCL alumni include Marie Stopes, Jonathan Dimbleby, Lord Woolf, Alexander Graham Bell, and members of the band Coldplay.

UCL is in practice a university in its own right, although constitutionally a college within the federal University of London. With an annual turnover around £600 million, it is financially and managerially independent of the University of London.

The UCL community: UCL currently employs approximately 8,000 staff and includes academic units as diverse as the Slade School of Fine Art, the Bartlett School and the Institute of Child Health. In total, there are around 70 academic departments and institutes whose activities span the following: arts and humanities, social and historical sciences, law, architecture and the built environment, engineering, mathematical and physical sciences, life and clinical sciences, and medicine. UCL's academic and research staff are a truly international community with more than a quarter coming from 84 countries outside the UK.

12,000 undergraduates and 7,000 graduate students study at UCL, of whom over 25% come from 130 countries outside the UK. UCL offers 275 undergraduate programmes and more than 220 taught postgraduate programmes as well as the opportunity to carry out postgraduate research in all of its subjects.

Application procedure

Further details about the post and the application procedure are available at www.london-nano.com. If you are unable to apply online please contact Ms Denise Ottley at the London Centre for Nanotechnology, d.ottley@ucl.ac.uk or 17-19 Gordon Street, London WC1H 0AH, for advice.

University College London is committed to equality of opportunity and of eliminating discrimination. All employees are expected to adhere to the principles set out in its Equal Opportunities in Employment Policy, Promoting Race Equality policy and Disability Policy and all other relevant guidance/practice frameworks.