



London Centre for  
Nanotechnology 17-19 Gordon  
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[www.london-nano.com](http://www.london-nano.com)

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| <b>Job title:</b>            | Research associate  |
| <b>Job reference number:</b> | 1702944   |
| <b>Grade:</b>                | UCL Grade 7 Salary Range: £34,635 -£41,864<br>(including London Allowance)                            |
| <b>Terms and Conditions:</b> | In accordance with the conditions of<br>employment as laid down in the relevant UCL<br>Staff policies |
| <b>Reporting to:</b>         | Professor Guillaume Charras   |

#### **Key Duties and Responsibilities:**

This project at the interface between Biophysics and Cell Biology seeks to understand the link between signalling and cell mechanics with applications to tissue morphogenesis.

Shape change during cell and tissue morphogenesis is controlled biochemically by RhoGTPases, key regulators of the cytoskeleton and contractility. Changes in the activity of these master regulators lead to spatiotemporal changes in the mechanical properties of the cell cortex, which give rise in turn to shape change. Thus, the challenge in understanding cellular morphogenesis resides in linking localised spatiotemporal changes in signalling to local changes in cortical mechanics that will result in cellular-scale shape changes. **The goal of this project is to determine how spatiotemporal recruitment of master regulators regulates changes in cell mechanics that lead to tissue morphogenesis.** To do this, we propose to use optogenetics to control cell signalling. We will use AFM to characterize single cell mechanics before and after switching on signaling and custom built tissue stretchers. These data together with localization data for each regulator will be combined into a computational model to predict cell shape change during mitosis and migration. Morphogenesis at the tissue level requires the integration of individual cell shape changes across the tissue. Using the same tools as for individual cells, we will attempt to control the morphogenesis of tissues by activating signaling in subregions of the tissue.

Experimental work will be carried out at the London Centre for Nanotechnology.

The Postholder will be responsible for carrying out experimental research on the project using techniques including, but not limited to, optogenetics, molecular cell biology, laser ablation, CRISPR, and live confocal microscopy. The candidate will also be required to analyse the experimental data, and design new experimental techniques.

The person must have demonstrated ability for creative, original independent research of high impact. The person must be adept at multi-tasking and organizing their work to meet deadlines. He/She must have a proven track record of working in multi-disciplinary teams.

This research position is funded for 2 years and the preferred start date for this position is **14/02/18**.

### **Key requirements:**

The successful candidate will have a PhD in a relevant area of Life Sciences (or at least have submitted their thesis) with an outstanding track record of research and publications in high impact journals. Extensive experience in cell biology, molecular biology, optogenetics and microscopy is essential. Additional experience with CRISPR/Cas9 genome editing is desirable.

### **Duties and Responsibilities**

- To design and implement experiments aimed at understanding how signaling controls cell and tissue mechanics using optogenetics.
- To analyse experimental data.
- To design analysis software with assistance from other lab members.
- To carry out baseline experiments and perturbation experiments.
- To generate cell lines expressing GFP fusions to signaling proteins using genome editing.
- To image localization of signaling proteins during mitosis using live confocal microscopy, and lattice light sheet microscopy.
- To design and generate new probes for control of signaling.
- To design and implement experiments aimed at understanding how signaling controls tissue morphogenesis and mechanical properties using optogenetics with support from other lab members.
- To generate stable cell lines expressing constructs of interest using lentiviruses.
- To generate knock down cell lines using lentiviral shRNA.
- To collaborate with theoretical physics and biophysics collaborators to investigate the mechanical properties of single cells and cell monolayers.
- 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.
- To be 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 Professor 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**

### **Educational Qualifications**

Essential: Applicants should have a PhD Degree in a relevant area of Life Sciences, or at least have submitted their thesis.

### **Essential Experience**

- Experience in Cell Biology.
- Experience in Developmental Biology.
- Experience of generation of stable cell lines.
- Experience of lentivirus generation.
- Experience in Molecular Biology and Molecular cloning.
- Experience of multi-disciplinary working.
- Experience of genome editing.
- Experience with Biochemistry and Western blotting.
- Experience with live cell confocal microscopy and light sheet microscopy.
- Experience in advanced 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.
- Proven publication track record in high impact journals.
- Proven ability to work in multidisciplinary settings.
- Ability to conceive, design, and develop new experiments.

### **Essential Skills and Abilities**

- Demonstrated ability for creative and original research of the highest impact.
- Ability to multi-task and organize own work with minimal supervision to meet deadlines.
- Ability to maintain clear and up-to-date lab notebook and deliver written reports to management team and funding body.
- Excellent verbal communication skills and ability to relate appropriately to others and to work as part of a team.
- Ability to communicate results effectively at meetings and conferences.
- Excellent written communication skills and the ability to write clearly and succinctly to a level consistent with publication in highly regarded international journals.

### **Desirable Experience**

- Experience with lattice light sheet microscopy.
- Experience of genetics.

## **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 world's 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 five world universities in the 2014 THES-QS World University Rankings, and in the top 20 of the 2014 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 £1 billion, 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](http://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](mailto:d.ottley@ucl.ac.uk) for advice. Informal inquiries about the position and project should be directed to Professor Guillaume Charras ([g.charras@ucl.ac.uk](mailto:g.charras@ucl.ac.uk)) who will be supervising the research.

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.