

<b>Title:</b>	<b>Research Associate</b>
<b>Reference:</b>	<b>1639796</b>
<b>Grade:</b>	<b>Grade 7</b>
<b>Salary:</b>	<b>£34,056 - £41,163 (inclusive of London Allowance)</b>
<b>Terms and Conditions:</b>	In accordance with the conditions of employment as laid down in the relevant UCL Staff policies
<b>Accountable to:</b>	<b>Professor Guillaume Charras</b>

#### **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 cell and 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 mitotic morphogenesis.** To do this, we propose to use optogenetics to control cell signalling. We will use AFM to characterize cell mechanics before and after switching on signaling. These data together with live microscopy of regulator localization will be combined into a computational model to predict cell shape change during mitosis.

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. This part of the project relies on a novel culture and mechanical testing system recently developed in the Charras lab (*Harris et al, Nat Protocols, 2013*). This system allows simultaneous imaging and monitoring of mechanical changes within the tissue.

This research will be carried out in close collaboration with the laboratory of Dr Guillaume Salbreux at the Crick Institute who will design and implement the computational simulation. Experimental work will be carried out at the London Centre for Nanotechnology. This project builds on previous work by members of the

team (Harris AR et al, *PNAS*, 2012; Moeendarbary et al, *Nat Materials*, 2013; Wyatt TPJ et al, *PNAS*, 2015; Valon et al, *Nat Comms*, 2017).

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, biophysical force measurement techniques (AFM, optical tweezers, monolayer testing), and live confocal microscopy. The candidate will also be required to analyse the experimental data, write Matlab analysis programs, 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 3 years in the first instance and the preferred start date for this position is 1 September 2017.

### **Key requirements:**

The successful candidate will have a PhD in a relevant area of Life Sciences or Physical 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, biophysics, optical microscopy, and atomic force microscopy is essential. Additional experience in programming, developmental biology, molecular biology, and optogenetics will be an advantage.

### **Duties and Responsibilities**

- To design and implement experiments aimed at understanding how signaling controls cell mechanics using AFM and optogenetics.
- To design and implement data analysis software.
- To analyse experimental data.
- To carry out baseline experiments and perturbation experiments.
- To image localization of signaling proteins during mitosis with support from other members of the lab.
- To design and generate new probes for control of signaling with support from other members of the lab.
- To design and implement experiments aimed at understanding how signaling controls tissue morphogenesis and mechanical properties using optogenetics, suspended monolayers and the mechanical testing setup implemented in the Charras lab.
- To generate stable cell lines expressing constructs of interest with assistance from other members of the lab.
- To collaborate with theoretical physics and biology 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 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.

### **Educational Qualifications**

Essential: Applicants should have a PhD Degree in a relevant area of Life Sciences or Physical Sciences.

### **Essential Experience**

- Experience in Cell Biophysics.
- Experience of working with Atomic Force Microscopy.
- Experience in Cell Biology.
- Experience of multi-disciplinary working.
- Experience of programming with MatLab and Labview.
- 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.
- Proven publication track record in high impact journals.
- 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 in Molecular Cloning.
- Experience of Developmental Biology.
- Experience with Biochemical techniques such as Western blotting, immunostaining, etc.

### **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 exploit core competencies in 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 much major collaboration. 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**

UCL is one of the world's top universities. Based in the heart of London, it is a modern, outward-looking institution. At its establishment in 1826, UCL was radical and responsive to the needs of society, and this ethos – that excellence should go hand-in-hand with enriching society – continues today.

UCL's excellence extends across all academic disciplines; from one of Europe's largest and most productive hubs for biomedical science interacting with several leading London hospitals, to world-renowned centres for architecture (UCL Bartlett) and fine art (UCL Slade School).

UCL is in practice a university in its own right, although constitutionally a college within the federal University of London. With an annual turnover exceeding £1 billion, it is financially and managerially independent of the University of London.

## The UCL community

UCL's staff and former students have included 29 Nobel Prize winners. It is a truly international community: more than one-third of our student body – more than 35,000 strong – come from 150 countries and nearly one-third of staff are from outside the UK.

UCL offers postgraduate research opportunities in all of its subjects, and provides more than 200 undergraduate programmes and more than 400 taught postgraduate programmes. Approximately 54% of the student community is engaged in graduate studies, with about 29% of these graduate students pursuing research degrees.

## Quality of UCL's teaching and research

UCL is independently ranked as the most productive research university in Europe (SIR).

It has 983 professors – the highest number of any university in the UK – and the best academic to student ratio of any UK university (*The Times*, 2014), enabling small class sizes and outstanding individual support.

In Research Excellence Framework 2014 (REF2014), UCL was rated the top university in the UK for 'research power' (the overall quality of its submission multiplied by the number of FTE researchers submitted). It was rated top not only in the overall results, but in each of the assessed components: publications and other research outputs; research environment; and research impact. REF2014 confirmed UCL's multidisciplinary research strength, with many leading performances across subject areas ranging from biomedicine, science and engineering and the built environment to laws, social sciences and arts and humanities.

## Equality

UCL is proud of its longstanding commitment to equality and to providing a learning, working and social environment in which the rights and dignity of its diverse members are respected.

Some highlights below:

- **Race Charter Mark** - UCL holds a Bronze Race Equality Charter Mark award, recognising UCL's commitment to improving the representation, progression and success of minority ethnic staff and students.
- **Athena SWAN** - UCL holds an institutional Silver **Athena SWAN** award – this recognises our commitment to and impact in addressing gender equality. Departments at UCL are also engaged in the Athena SWAN charter, with 29 departments holding an award; 16 Silver and 13 Bronze.
- **Staff networks** - We have a number of staff networks that run a range of social and development activities, for example **Out@UCL**, **PACT**, **Enable@UCL**, **the race equality staff network**, **Astrea** and **UCL Women**.

- **B-MEntor** – **B-MEntor** is a mentoring scheme for black and minority ethnic staff. The mentoring scheme is a collaborative initiative with a number of London-based universities.
- **Sabbatical Leave following maternity** – UCL provides one term of sabbatical leave without teaching commitments for research-active academics returning from maternity, additional paternity, adoption or long-term carer's leave. This support for returners enables staff to more quickly re-establish their research activity.

Please see our [Equalities and Diversity Strategy 2015-2020](#) for information on our current priorities.

### Location and working environment

Based in Bloomsbury, UCL is a welcoming, inclusive university situated at the heart of one of the world's greatest cities.

UCL's central campus is within easy reach of Euston, Kings Cross and Marylebone mainline stations, the new Eurostar terminal at St. Pancras and the following Underground stations - Euston Square, Warren Street, Goodge Street and Russell Square. Road connections to the M1 and M40 motorways give easy access to the north and west road networks. There are also good public transport links to Heathrow airport.

### **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 framework.