

PhD Studentship

London Centre for Nanotechnology
University College London



PhD studentship in quantum nanodiamond diagnostics for ultra-sensitive virus detection

Applications are invited for a fully funded PhD Studentship to work with Professor Rachel McKendry (London Centre for Nanotechnology & Division of Medicine). The award is funded by the London Centre for Nanotechnology at UCL.

The studentship will cover Home tuition fees and an annual stipend of no less than £17,609 increasing annually with inflation. The studentship is funded for 3.5 years on a full-time basis, or up to 7 years on a part-time basis. Part-time stipend figures are pro-rata.

The successful applicant is expected to start in September/October 2021.

Studentship Details

COVID-19 highlights the enormous human and economic consequences of an emerging virus. Diagnostic tests are playing a central role in the pandemic but inadequate test sensitivity of lateral flow tests can lead to false negative results and risk of onwards transmission. [Prof McKendry's](#) team at University College London have made a recent breakthrough that exploits the quantum properties of nitrogen-vacancy centres in nanodiamond for ultra-sensitive virus detection. The work was published in the journal Nature (Miller et al. Spin-enhanced nanodiamond biosensing for ultrasensitive diagnostics. Nature 587, 588–593 (2020). <https://doi.org/10.1038/s41586-020-2917-1>). The approach uses the fluorescent properties of nanodiamonds – brightness, low cost, stability, and selective manipulation of their emission – for in vitro biosensing. This research works on the principle of improving signal-to-noise ratio by removing background autofluorescence, an inherent sensitivity limitation of lateral flow diagnostic tests. This, along with their high brightness, leads to improved analytical sensitivity. This ultrasensitive quantum diagnostics platform is applicable to numerous diagnostic test formats and diseases, and has the potential to transform early diagnosis of disease for the benefit of patients and populations.

The project will involve nanoparticle functionalisation and characterisation, fluorescence imaging, development of measurement systems comprising of optical and electronic components; biochemical binding kinetics; diagnostic assay development and evaluation with clinical samples. This is an exciting interdisciplinary studentship at the cutting interface of quantum/nanotechnology, biomedical engineering, medicine and public health and is aligned to the large i-sense EPSRC IRC in Agile Early Warning Sensing Systems for Infectious Diseases and AMR (www.i-sense.org.uk).

Professor Rachel McKendry is Professor of Biomedical Nanoscience and holds a joint position between the London Centre for Nanotechnology and Division of Medicine, University College London. In addition, she is Director of the £11M i-sense EPSRC IRC, a large interdisciplinary research collaboration in [Early Warning Sensing Systems for Infectious Diseases](#). Her research lies at the cutting edge of nanotechnology, telecommunication, big data, infectious diseases and public health. Other recent breakthroughs span from nanomechanical sensors for antimicrobial resistance (Ndieyira et al [Nature Nanotechnology](#) 3, 691 (2009), Bennett et al [ACS Sensors](#) 5, 3132 (2020)), smartphone connected tests for infectious diseases (Wood et al [Nature](#) 566, 467 2020), to deep learning models for rapid testing in partnership with the Africa

Health Research Institute in South Africa. Her team led a major strategic review of the global use of digital technologies for COVID-19 (Budd et al [Nature Medicine](#) 26, 1183 (2020)). Professor McKendry has won several awards for her research including the Royal Society Rosalind Franklin Award, Royal Society Wolfson Research Merit Award and the Institute of Physics Paterson Medal. She also co-chaired the [Digital Medicine Theme of the Topol Review of the NHS](#), 'Preparing the Healthcare Workforce to Deliver the Digital Future', led the [Rosalind Franklin Appathon, and gave a TEDx talk, viewed over 34,000 times](#). For more information please visit the [McKendry website](#) and [i-sense EPSRC website](#).

Eligibility

Suitable candidates for this post will have an upper second class or first class honours undergraduate degree and/or a post-graduate masters qualification in any of the following disciplines - physical sciences, engineering, or equivalent discipline. They must be able to demonstrate a high level of motivation, a track record in high quality research, an ability to work collaboratively in teams, to multi-task and organise their work to meet deadlines. Excellent written and oral communication skills are essential.

Apply

Interested candidates should submit a supporting statement, a full CV (including contact details for at least two academic referees) and a copy of transcripts to-date via the [PhD Portal](#).

The supporting statement should clearly state the name of the project you are applying for at the top, and outline your interest in and suitability for, researching the suggested topic. On the application form, you do not need to complete the "Layman Summary" question, please just indicate the name of the project in this section instead. Referees will be contracted separately, so you do not need to supply references at the point of application. You will need to tick the box on the PhD Portal application form indicating this.

The successful candidate will be invited to submit a formal application to UCL. If you have not heard from us by July 31st 2021, regrettably we have been unable to progress your application further on this occasion.

The closing date for applications is **30 June 2021**, and interviews will be held in early July 2021. The project will commence in September / October 2021. Any inquiries or further information about the studentship should be emailed to r.a.mckendry@ucl.ac.uk.