

Two PhD Studentships – 4 Years

ERC Starting Grant: Visualising Supramolecular Assembly by Preparative Mass Spectrometry (VISUAL-MS)

We are seeking to recruit up to two 4-year PhD Students to join a highly motivated multidisciplinary research team that will tackle a challenging 5 year European Research Council (ERC) Starting Grant project. The students will be based at the Department of Chemistry of the University of Warwick and work under the supervision of Professor Giovanni Costantini. The studentship provides UK tuition fees and an annual tax-free stipend at Research Council rates (£13,726 in 2013/14). Funding will be for four years of full-time study (+3 Scheme), starting as soon as possible.

Background

The ability to investigate the structure and the assembly of individual functional adsorbed molecules with sub-nm resolution is an essential, and yet missing, step in the development of a molecular scale foundation of many contemporary research fields. In order to achieve these goals, ultra-high resolution microscopy techniques are needed. However, these require that complex molecular units are deposited onto well-defined substrates under controlled conditions and are analysed in situ. This is beyond the current state-of-the-art. In fact, thermal sublimation in ultra-high vacuum is the strategy of choice for small and heat-resistant molecules, but larger functional (bio)molecules are not compatible with this process. The ERC funded research project VISUAL-MS (total of 5 years) will address this challenge by adapting techniques developed within the field of mass spectrometry for transferring intact fragile molecules into the gas phase, by soft-landing them onto atomically clean substrates. The resulting unique deposition set-up will successively be combined with in-situ scanning probe microscopy. This interdisciplinary approach will expand the boundaries of modern surface science by enabling the application of high resolution diagnostic techniques to essentially any type of complex functional molecule adsorbed on a substrate. As such, it represents an essential step change in analytical capability and will provide ground-breaking new insight into a number of fundamental molecule-substrate interactions.

Research Objectives

You will be involved in the development and application of a variety of new experimental techniques to systematically advance our understanding of the interaction of complex molecular units with surfaces and interfaces. In particular, you will work as part of a team to design, build and test a novel type of ion soft-landing apparatus and to integrate it with state of the art scanning probe microscopy techniques. This unique instrument will allow a ground-breaking new approach to the controlled functionalisation of surfaces. In particular, you will apply this innovative experimental setup to explore the adsorption, conformation, mutual interaction and real-time dynamics of peptides on surfaces with ultimate spatial resolution.

We are looking for someone who has:

Essential:

- strong motivation and work ethic;
- the ability to think creatively and to work both independently and as part of a team;
- an excellent master's (or equivalent) degree in physics, chemistry, engineering or materials science;
- good interpersonal and communication skills;
- the ability to give effective presentations and to write reports of high standards;
- strong experimental skills;

One or more of the following would be desirable:

- experience in scanning probe microscopy;
- experience in mass spectrometry instrumentation development;
- experience in vacuum technology and surface science;
- experience in instrumentation development;
- a record of publication.

We expect that the proposed programme will be of very high impact and we are seeking an enthusiastic and committed person to join our research team.

Location and Environment

You will be working in the research group of Professor Giovanni Costantini, which is part of the Physical Chemistry Research Cluster/Section in the Department of Chemistry at the University of Warwick. The project will be conducted in collaboration with an extended and experienced multidisciplinary research team. Further information on the Costantini group can be found at:

<http://www2.warwick.ac.uk/fac/sci/chemistry/research/costantini/costantinigroup>

How to apply

Applicants are required to provide:

- academic CV;
- official full list of courses and grades from your university;
- contact details of two suitable referees;
- covering letter outlining your suitability for the study and your research experience to date.

Applications should be emailed to: g.costantini@warwick.ac.uk. The successful candidate will be required to submit a full University of Warwick on-line application to fulfil the normal admissions process. Any enquiries relating to the project and/or suitability should be directed to Giovanni Costantini at the address above.

Awards available: Up to 2 awards available

Funding Details: Fees and Maintenance at the RCUK level (£13,726 / year)

Length of Award: 4 years (PhD)

Eligibility: Available to UK, EU and Overseas students

Application Details: Informal enquiries may be directed to Professor Giovanni Costantini (g.costantini@warwick.ac.uk).