

The
University
Of
Sheffield.

3.5 years PhD studentship, starting October 2020

In graphene-based sensors for soil analysis: spectroscopic and theoretical study

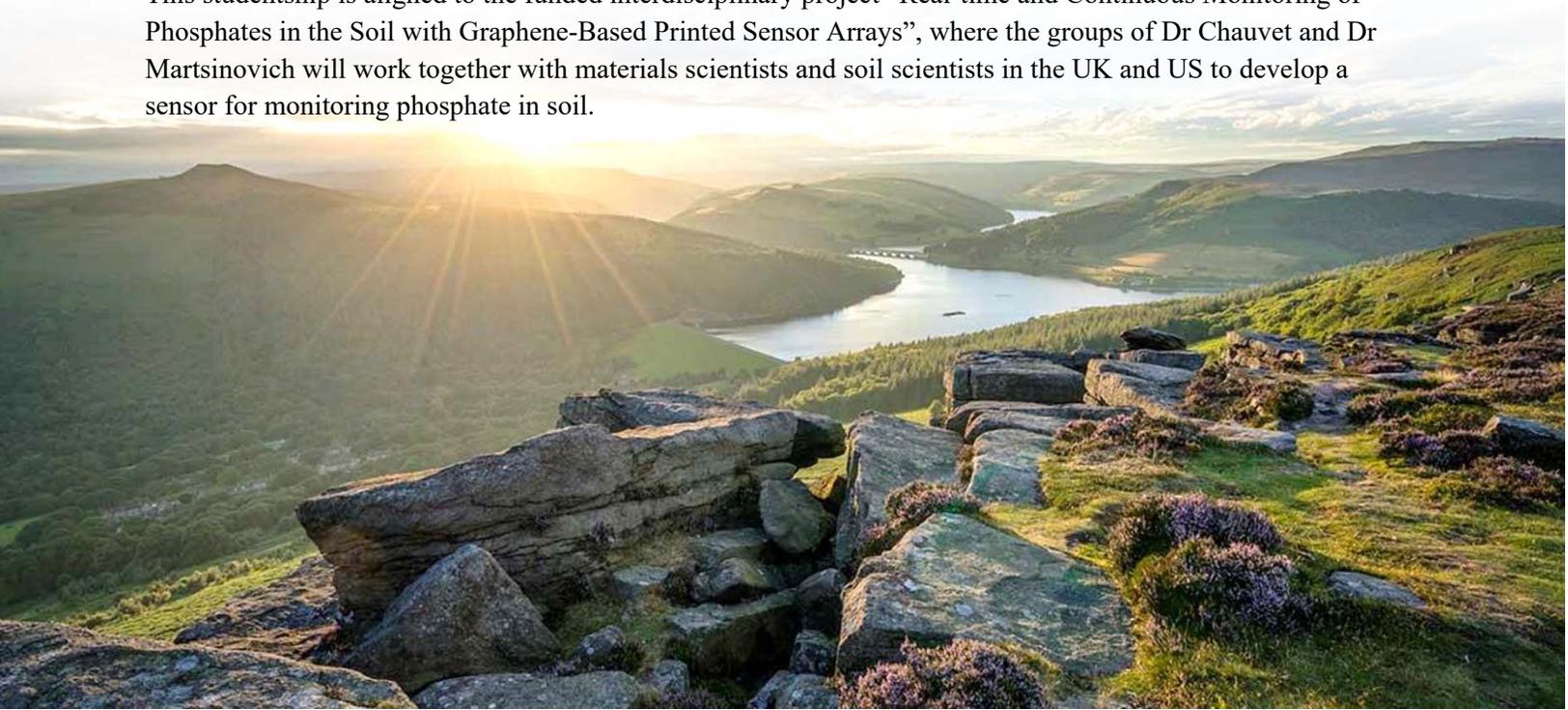
Project description

Precise monitoring of soil compositions is key to achieving sustainable farming practices and protecting the environment. Our goal is to develop highly selective and low-cost graphene-based sensors to detect a variety of small molecules and ions in soil. In this project, the student will characterise both theoretically and experimentally the selectivity of these sensors to socio-economically important plant nutrients: phosphate and nitrate.

Graphene is already being exploited as a sensor material. Advantageously, graphene is highly versatile and can be altered in composition (through doping or defects) as well as structurally (from planar to 3D via laser ablation). Any alteration in composition and structure will alter the sensing properties of these graphene materials. In other words, graphene can be fine-tuned to sense specific small molecules or ions.

This project will be a joint spectroscopic and computational study, co-supervised by Dr Adrien Chauvet (ultrafast spectroscopy) and Dr Natalia Martsinovich (computational modelling). In Dr Chauvet's group, the student will explore the electronic properties of various graphene surfaces using the latest time-resolved ultrafast spectroscopy equipment available in the Lord Porter Laser Laboratory. In Dr Martsinovich's group, the student will then explore the theoretical affinity of these various graphene surfaces to small molecules and ions, such as phosphate. With this dual approach, the student will be able to correlate experimental and theoretical data to inform development (via existing collaboration) of new graphene sensors.

This studentship is aligned to the funded interdisciplinary project "Real-time and Continuous Monitoring of Phosphates in the Soil with Graphene-Based Printed Sensor Arrays", where the groups of Dr Chauvet and Dr Martsinovich will work together with materials scientists and soil scientists in the UK and US to develop a sensor for monitoring phosphate in soil.



Eligibility

You are an enthusiastic student that has or expects to receive a 1st class or 2.1 MChem degree or equivalent in Chemistry or related subject. You are willing to work in a diverse environment, are self-motivated and have leaderships abilities.

This studentship is open to UK and EU applicants only. UK applicants and EU applicants who have been ordinarily resident in the UK for at least 3 years prior to the start of the studentship are eligible for a fully-funded studentship (fees and a stipend). EU citizens who did not have lived in the UK for the last 3 years preceding the start of the studentship would normally be eligible for a Fees Only Award. The Fee Award does not include a stipend, therefore additional funding to cover living costs for at least 3 years need to be sought from another source.

How to apply

The application **deadline is the 17th February 2020**. Please apply online at:
<https://www.sheffield.ac.uk/postgraduate/phd/apply/applying>

For more information about the project, please contact Dr Adrien Chauvet (a.chauvet@sheffield.ac.uk) or Dr Natalia Martsinovich (n.martsinovich@sheffield.ac.uk).

The University of Sheffield is a **world top 100 university** and **world top 50 most international**, situated at the edge of Sheffield's historical downtown, and only 6km away from the Peak District national park with direct train connections to London (2.5h), Manchester (1h) and Leeds (<1h).

Please contact a.chauvet@sheffield.ac.uk for any queries, or apply directly at <http://bit.ly/Job-Chauvet>

We are looking forward to hearing from you.

Dr. Adrien Chauvet & Dr. Natalia Martsinovich, Chemistry Dept., Dainton Building, The University of Sheffield, Sheffield S3 7HF, United Kingdom.

<https://teamchauvet.com/>

https://www.sheffield.ac.uk/chemistry/staff/profiles/natalia_martsinovich

<https://www.sheffield.ac.uk/faculty/science/research/facilities/laserlab>

