



PHD PROJECT

Measuring and modelling the interfacial properties of crude oil

Supervisor: Matthew Jackson

The interfacial properties of crude oil are of broad interest across a wide range of disciplines and applications. This project will have a particular focus on measuring and modelling the surface electrical charge developed at the crude-oil-brine interface, which is important because it governs the electrostatic interactions between the interface and polar species in aqueous and non-aqueous solution. These electrostatic interactions play a key role in controlling how crude oil adheres to rock and soil grains and, therefore, how crude-oil behaves as a contaminant during remediation and as a resource during production.

The successful applicant will join the Novel Reservoir Monitoring and Simulation (NORMS) group at Imperial College London (<https://www.imperial.ac.uk/earth-science/research/research-groups/norms/>). The NORMS Reservoir Physics Laboratory has developed a unique experimental method to measure the surface charge on the crude-oil-brine interface (characterized by the zeta potential) at conditions relevant to natural systems, including elevated temperature and complex, high ionic strength brines.

Preliminary results show that the surface charge is highly sensitive to temperature, and to the brine and oil composition. However, further work is required to develop the method and test it against a range of crude-oil-brine systems and at different temperatures. Further work is also required to develop a predictive model for the crude-oil surface charge.

The aim of this project is to build on research conducted to date in the NORMS group at Imperial College to deliver an experimental protocol and predictive model to determine the surface electrical charge at the crude-oil-brine interface in natural systems.

Applications are invited from geoscientists, chemists, physicists and engineers with experience of designing, conducting and interpreting laboratory experiments and genuine interest in the research area. The successful applicant will join an active and supportive research group working on similar problems.

The project will seek funding from the UK Engineering and Physical Sciences Research Council (EPSRC) via a Collaborative Award for Science and Engineering (CASE) with industrial partner BP. If the funding application is successful, the student will undertake a 3-month internship with BP as part of the project.

How to apply

Application forms and instructions can be obtained from our website (<http://www3.imperial.ac.uk/earthscienceandengineering/courses/phdopportunities/phdapplicationprocedure>). Further information about the project can be obtained from Prof. Matthew Jackson (m.d.jackson@imperial.ac.uk Tel: ++44 (0) 207 594 6538).

The NORMS group is committed to encouraging equality, diversity and inclusion within our group and in the broader science and engineering community. We recognise that science and engineering subjects continue to lack diversity and want NORMS to be a group actively leading change.

Funding for this project is only available to students who qualify for 'home' fees status. Please do not apply if you do not qualify for the funding.