Smart road markings through regulating the bulk material properties of polymeric materials (OU and WJ Group)

Supervisory team: Dr James Bruce, Dr Simon Collinson, Garry Duncan

Ref:
Based in The School of Life, Health and Chemical Sciences (LHCS), The Open University, Milton Keynes
Four years from 1st February 2020
Stipend: £15,375 per year.

This project will develop new polymer-based materials where the rate and direction of reaction can be controlled by external environmental factors such as light, temperature and time. The aim will be to understand and hence control the reaction conditions to produce materials with desired bulk properties such as curing time, adhesion and hardness. The initial focus will be on polymerisation reactions that are thermally regulated reactions, where the rates of forward and reverse reaction proceed at different temperatures. This opens the possibility of designing polymer-based coatings that can be added and removed, and hence recycled, at different temperatures to reduce the environmental impact. The project will explore the chemical factors that influence the rate of reaction and the properties of the final product through testing the reaction conditions on simple starting material to more complex monomers. Thus, the candidate will gain experience is the synthesis and characterisation of these compounds using techniques in polymer synthesis, HPLC, NMR and mass spectrometry. The next stage of the project will see additives being incorporated into polymer systems that enhance water resistance and luminosity/reflectivity.

This project is funded by and in collaboration with the WJ group a company engaged in the manufacture and application of road markings. They are interested in developing alternatives to the current high temperature thermoplastics currently used. The use of more benign reversible conditions to apply materials as road markings potentially opens up the use of more environmentally sustainable materials as well as enhancing the performance of road markings. The project will involve working closely with the company and therefore there is the opportunity to gain industrial experience and understanding of how chemistry is applied in a commercial context. It offers routes to employment into either academic or non-academic career paths.

Further information

This four-year research studentship is funded by the WJ Group and is based at The Open University in Milton Keynes and provides a stipend of £15,375 per year. All academic fees (at UK/EU level) are covered. There will also be support for conference and workshop participation. The student would be required to live in the
UK and within commuting distance of The Open University in Milton Keynes. Interested candidates will be expected to have a degree (classification 2:1, or higher) in chemistry, materials sciences, natural sciences, or a relevant subject. The ideal candidate would have a good background in synthetic chemistry. Good numeracy, ICT, communication and organisation skills are highly desirable.

Informal enquiries relating to the project should be directed to Dr James Bruce (James.Bruce@open.ac.uk).

**How to Apply**
Please send an email with your CV, a completed application form and a personal statement (outlining your suitability for the studentship, what you hope to achieve from the PhD and your research experience to date) to STEM-LHCS-PHD@open.ac.uk

**Closing date:** 29th November 2019

**Interview date:** Interviews will be arranged promptly after the closing date and can be conducted via Skype if appropriate.

LHCS holds Athena Swan Bronze Status. We promote diversity in employment and welcome applications from all sections of the community.