SEAHA CENTRE FOR DOCTORAL TRAINING IN SCIENCE AND ENGINEERING IN ARTS HERITAGE AND ARCHAEOLOGY

Fully Funded Studentship:

From Samples to Complex Objects: Detecting Material Degradation in Plastic Artworks

This doctorate offers an exciting opportunity to work with Tate's collection to explore the application of VOC sensors for detecting material degradation in plastic artworks.
The detection and analysis of volatile organic compounds (VOCs) is finding increased use in both medicine and the food industry, as a non-destructive means of disease diagnosis and of detecting spoilage respectively. This project seeks to apply the same approach to the detection of degradation products from plastic objects in heritage collections and to explore the challenges of bringing this research into practice in the cultural heritage sector, through a collaboration with conservation scientists and conservators at Tate, London and Arkema, France.

The project is centred around the application of analytical chemistry and degradation studies to model systems and later to twentieth-century plastic artworks. Various different analytical techniques including solidphase microextraction gas chromatography mass spectrometry (SPME-GC/MS), electrochemical sensors and more low-tech, paper-based sensors will be used to detect VOC emissions from plastic objects in a laboratory context and from objects in real museum collections to understand: (i) whether it is possible to demonstrate a correlation between VOC emissions and key signs of deterioration in common plastics within contemporary art collections and (ii) whether and how this information can be deployed within collections to identify works that require examination or to monitor mitigation and preventive measures. These two goals are key to translating the benefits of this research into tangible outcomes for the care and management of museum collections.
This project provides the opportunity to develop skills in a range of analytical tools employed to detect and understand deterioration in plastic objects, including SPME-GC/MS, Fourier Transform Infrared (FTIR) spectroscopy, Near-Infrared (NIR) spectroscopy and colorimetry, to gain practical experience of working with the conservation department of a major art gallery with a busy programme of collections care and display activities and to gain experience in an industrial setting with partners Arkema.

The following research questions are of interest:

1. Can a correlation be made between VOC emissions and visible forms of deterioration in plastic artworks?
2. How can we translate the work carried out using plastic samples to complex plastic objects within collections?
3. Can the detection of VOC emissions from plastic objects of specific polymer types, stored in heritage collections, be used as a non-destructive method for understanding ongoing degradation processes and changes in material properties?
4. What practical methodologies can be developed for the analysis of VOC emissions from plastic objects using sensors?
5. How can the detection of VOC emissions from plastic objects be practically applied in a museum context? How can it become part of a preventive conservation strategy?

The project is part of the EPSRC Centre for Doctoral Training in Science and Engineering in Arts, Heritage and Archaeology at University College London, University of Oxford and University of Brighton (www.seaha-cdt.ac.uk), in collaboration with Tate (http://www.tate.org.uk/) and Arkema

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(http://www.arkema.com/en/) Co-funded by the Engineering and Physical Sciences Research Council (EPSRC) through the Centre for Doctoral Training and the newly awarded H2020 European Project - NanoRestart, the four year doctoral research programme will be supervised jointly by UCL Institute for Sustainable Heritage (http://www.bartlett.ucl.ac.uk/heritage), the UCL Department of Chemistry (http://www.ucl.ac.uk/chemistry), Tate and Arkema. The student will be based at the UCL Institute for Sustainable Heritage and periods of research work at Tate Britain, London, The National Institute of Chemistry, Ljubljana, Slovenia and Arkema, based in France are expected. For further details contact Dr Katherine Curran, k.curran@ucl.ac.uk, the principal academic supervisor.

As a SEAHA student, you will have unparalleled access to expertise and research infrastructure across three universities and almost 50 research, heritage and industrial partners. In addition to the university doctoral training requirements, SEAHA students study together as a cohort and are involved in an exciting range of cohort activities, ranging from residential events and group projects, to conferences and careers events. Please visit the SEAHA website (www.seaha-cdt.ac.uk) for details.

The Studentship will cover home fees and a stipend of up to a maximum of £16,726 per year (current rate) for eligible UK/EU applicants, and a substantial budget for research, travel, and cohort activities.

The application should include:

- A covering letter clearly stating your motivation
- The UCL graduate application form which can be downloaded via UCL's web site: http://www.ucl.ac.uk/prospective-students/graduate/apply/apply-now/ucl-graduate-application-form.pdf
- Two academic references
- A copy of your degree certificate(s) and transcript(s) of degree(s),
- Proof of meeting the UCL English language proficiency requirements where necessary. For SEAHA candidates, an advanced level certificate is normally required (details of English language proficiency requirements can be found at http://www.ucl.ac.uk/prospective-students/graduate/apply/english-language/index)
- A short research proposal (max. 2000 words) taking into consideration the above research questions.

The award will be subject to a Collaboration Agreement between the student, UCL, Tate and Arkema.

Applications should not be submitted by UCL online admissions system. Instead, they should be sent directly to the SEAHA Centre Manager: manager@seaha-cdt.ac.uk Applications are by email only.

Application deadline: Midnight (GMT), 19th June 2015.

UCL Taking Action For Equality.