Northeastern University
College of Engineering

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Distinguished Seminar Speaker

Electrosynthesis of Conducting Polymer Thin Films at a Polarizable Liquid | Liquid Interface

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Abstract: Per- and polyfluoroalkyl substances (PFAS) are a diverse family of highly fluorinated and persistent anthropogenic chemicals first synthesized in the 1940s that are not known to degrade under natural conditions. They are broadly used in modern commerce and are now detectable in the most remote environments on Earth. Manufacturing and industrial use of PFAS has shifted dramatically since the onset of their widespread production as concerns about human and ecological exposures to legacy PFAS have grown. The result has been abundant production of compounds in recent decades that are unknown/poorly identified because they lack available analytical standards needed to quantify their presence. Resulting major uncertainties about their fate include degradation in the environment and metabolism by organisms, propensity for bioaccumulation, and even their definition as part of the PFAS family of chemicals. This presentation will provide an overview of recent work toward developing total organofluorine mass budgets for U.S. human serum and liver samples and exposure media including freshwater fish, agricultural products, drinking water, and consumer products. Results will highlight major classes of compounds identified using targeted and non-targeted mass spectrometry in combination with combustion ion chromatography to characterize extractable organofluorine. Modeling techniques that help interpret these data and better identify and attribute sources of PFAS contamination will be reviewed. These data will be used to discuss the implications for future policy mechanisms and consumer interventions such as water filtration for mitigating future exposures.

Biography: Professor Micheál D. Scanlon graduated with a bachelor's degree in chemistry from University College Cork (UCC), Ireland, in 2005. He then went on to do a PhD in electrochemistry (2005-2009) at the Tyndall National Institute, Cork, Ireland, under the mentorship of Professor Damien W.M. Arrigan. Following that he carried out postdoctoral research under the supervision of Professor Edmond Magner at the University of Limerick (UL), Ireland from 2009 to 2011, and under the supervision of Professor Hubert H. Girault at École Polytechnique Fédérale de Lausanne (EPFL), Switzerland, from 2011 to 2014. He established his own independent research group in 2014 in the Department of Chemistry at UCC upon winning a Science Foundation Ireland Starting Investigator Research Grant. He was awarded a European Research Council (ERC) Starting Grant in 2016. Subsequently, he was hired as an Associate Professor B in the Department of Chemical Sciences at UL in 2017 and joined the Bernal Institute at UL as a principal investigator. He has since been promoted to Associate Professor A (2020) and Professor (2022). At UL he has built an activity around electrochemistry at polarizable liquid | liquid interfaces to pioneer new approaches to the (photo)electrocatalysis of energy related reactions, the electrosynthesis of conducting polymer thin films and their nanocomposites, and the bioelectrochemistry of the model enzyme Cytochrome c (for more details see https://www.scanlonelectrochemlab.com/). He has published 1 book chapter and over 70 articles to date, in leading journals such as the Journal of the American Chemical Society, Chemical Science, Science Advances, and Angewandte Chemie International Edition. He is currently the Irish regional representative of the International Society of Electrochemistry.

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