



THE UNIVERSITY *of* EDINBURGH

School of Engineering

IMP Keynote seminar

17th May 2023

G.02, Elm Lecture Theatre

**Nanostructured Materials for
Energy Conversion, Storage and Separation
Prof Katie D. Li-Oakey**



11:30-12:30

The unique challenges in creating nanostructured materials arise from the gap between new material synthesis methods, fundamental mechanistic studies, and their destined engineering applications. To bridge this gap, efforts have focused on designing materials via a bottom-up approach to build material platforms that can be used to probe electron, ion, or molecule transport at various interface microenvironments, and a wide range of engineering applications. This seminar talk will focus upon three platforms: covalent organic frameworks (COFs), phase pure b-molybdenum carbide (Pt/Mo₂C)-supporting platinum, and electrospun carbon fibers from an unconventional carbon source. These materials will be used to illustrate a feedback loop between mechanistic studies of nanostructured materials and their engineering applications in energy conversion, storage, and separation. The feedback loop enables transformative solutions to often intractable engineering problems by examining the interfacial phenomena at atomic and molecular levels. Therefore, electronic, atomic or molecular level interface probing enables bottom-up design of materials to solve these persistent problems. In return, the solutions can be further optimized based on the performance of these materials in the desired application settings. Consequently, the feedback loop between fundamental research and application needs can be established and iterated.

SPEAKER

Dr. Li-Oakey received her Ph.D. under the guidance of Professors Bill Krantz, Bob Sanj and Alan Greenberg at University of Colorado, Boulder, with a focus on modeling and experimental studies of polymeric membrane morphology. Before she joined the faculty of the Uni. of Wyoming Department of Chemical Engineering in 2011, She has worked in companies ranging from startups to Fortune 100. Her research program at UW employs surface and interface chemistry, engineering, and bottom-up nanomaterial design and synthesis to address challenges in energy and healthcare. Over the course of her career, She has been recognized with the UW Chemical Engineering Outstanding Teacher of the Year (2016), NASA EPSCoR Space Grant Faculty Award (2013) and Anardako Faculty Award (2013), in addition to Fab Achievement Awards at Intel Corporation (2006 & 2007). Dr. Li-Oakey currently has 3 issued, 2 published patents, with two full patent applications pending. She founded TLS Materials LLC in 2016, aiming to commercialize these IPs.

