

DEPARTMENT OF CHEMICAL ENGINEERING SEMINAR

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1062 Bainer Hall



Catalyst Characterization: Why use a Synchrotron?

Simon R. Bare

Director of Chemistry and Catalysis
Stanford Synchrotron Radiation Lightsource
SLAC National Accelerator Laboratory

Abstract: The premise behind catalyst characterization is that the catalytic properties of a material are determined by its composition, and physical and electronic structure – often on the atomic scale. If we can measure these properties and understand their relationship with catalyst activity, then we will have knowledge to design these properties into the catalyst. There are many characterization techniques available in the catalyst characterization toolbox – so then why use the methods available at a synchrotron light source? In this talk I will discuss why the characterization methods available at today's synchrotron light sources are ideally suited to unravel the structural complexity of a practical working catalyst. This will be illustrated using examples from both my own work and from the literature, using a combination of synchrotron techniques but primarily focused on in-situ x-ray absorption fine structure (XAFS), in its many manifestations, as it provides detailed element-specific atomic-level structural and chemical information of the active catalyst. The talk will focus on the whole life of a catalyst, from synthesis, to operation, to deactivation and regeneration. Areas of future development will be discussed together with a look to the future.

Biography: Simon is the new director of chemistry and catalysis at Stanford Synchrotron Radiation Lightsource at SLAC National Accelerator Lab. He started there in April, 2016 after an almost 30-year career in R&D in the chemical industry. He aims to grow the catalysis program at SSRL, and looks forward to potential collaborations with you all. Simon graduated from the University of Liverpool in the UK, then had postdoctoral positions at Cornell University and Lawrence Berkeley National Laboratory. He then spent 10 years in R&D at Dow Chemical, before moving to Chicago and joining UOP LLC. Simon's research is motivated by studying the structure-property relationships of heterogeneous catalysts using in situ characterization techniques with an emphasis on X-ray absorption spectroscopy, micro- and nano-X-ray tomography and imaging. He is a fellow of the AAAS, and serves as a member of the Basic Energy Sciences Advisory Committee, among many other advisory committees. He has published over 80 publications, and holds 8 US patents.