

Advances in Understanding Operando Catalyst Structure Enabled by the Consortium for Operando and Advanced Catalyst Characterization via Electronic Spectroscopy and Structure (Co-ACCESS) at SSRL

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The Consortium for Operando and Advanced Catalyst Characterization via Electronic Spectroscopy and Structure (Co-ACCESS) at Stanford Synchrotron Radiation Lightsource was established in 2019 with the aim of providing the capability, knowledge, and resources at SSRL to allow any catalysis user to conduct their research in a safe and efficient manner, with a focus on *operando* X-ray absorption spectroscopy. The concept centers on the idea that collaborative research leads to shared knowledge and benefits for all involved. In the intervening years we have demonstrated both growth and impact of the catalysis science research conducted at SSRL. We have also developed software tools to aid the community, including CatMass, CatXAS, QuantEXAFS and MS-QuantEXAFS. In this presentation I will highlight how the development of these tools has enabled a deeper understanding of catalyst structure and function. Examples will include the characterization of single atom catalysts, catalyst dynamics, the evolution of catalyst structure, and how we have increased the complexity of the catalysis experiments. Examples will be given from both thermal heterogeneous catalysis and electrocatalysis. I will conclude with a look to the future, with the commissioning of beamline 10-2 at SSRL, a catalysis-centric QEXAFS beamline.