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CO-ACCESS

Semi-Annual

Consortium for Operando and Advanced Catalyst Characterization via Electronic Spectroscopy and Structure

Summer Edition

Summer
time!

Co-ACCESS Milestone:

At the end of May, Co-ACCESS supported its 300th beam time! We look forward to supporting the next hundred!

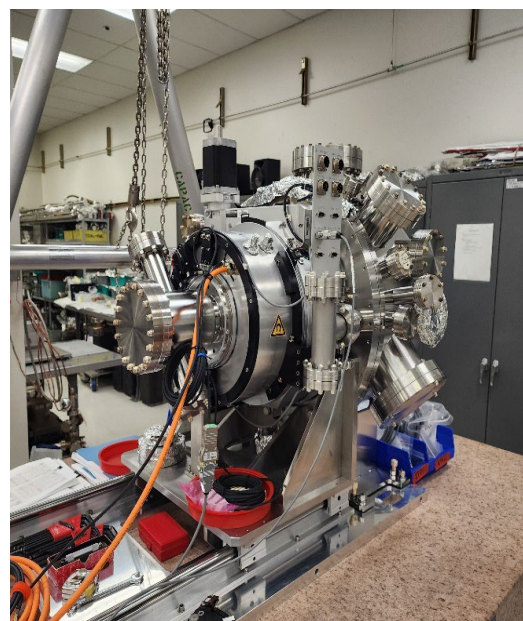
Co-ACCESS Office Hours:

Reminder, if you have any questions about XAS data processing or modeling or experimental design, stop in during our monthly office hours. If you would like to be added to the mailing list, please reach out to Adam at ashoff@slac.stanford.edu.

BL 10 Update

The QEXAFS Monochromator, it Moves!

Much has happened over the past year regarding the beamline 10-2 retrofit to a catalysis-centric beamline. The user control area is complete, and we are starting to plan out the sample preparation space, creating a safe space between user samples and that ever-needed cup of coffee next to the control PC. Gas cabinets for supplying flammables and toxics into the hutch are installed and we are in the process of procuring the flow hardware to deliver 9 different gases across 14 mass flow controllers. A dual-channel potentiostat was acquired, expanding our electrocatalysis characterization capabilities. Our 24-element solid state germanium detector arrived, and it is waiting for X-rays to begin commissioning. However, most importantly, all optic hardware is either installed and awaiting commissioning, or is undergoing final testing and is slated to be installed over the next couple of months. This includes the new quick-scanning monochromator which took its first rocking motion in May. With summer fast approaching we are unsure if we will see first light before the 2025 run, however, things are shaping up for an exciting year of commissioning starting this fall!



Let's Meet Up!

Members of the Co-ACCCESS team will be present at the following conferences meetings to give talks and to meet with fellow catalysis researchers. We look forward to meeting you in-person at these meetings! Please reach out to us if you would like to meet with us at one of these evets to talk about research and collaborations.

Fall 2024 American Chemical Society Meeting: Simon and Adam will give a talk on the current and up-coming XAS capabilities at SSRL to study the catalysis dynamics at various timescales.

2024 American Institute of Chemical Engineers (AIChE) Annual Meeting: Adam will give a talk about understanding the limits of PCA/MCR-ALS analysis applied to XAS through development of new software tools.

Additionally, Co-ACCESS was recently represented at the recent **18th International Congress on Catalysis** where Simon gave an invited talk in the limitations of XAS for characterization of single atom catalysts.

Welcome, Summer 2024 Interns!

This summer, Adam and Jiyun are each hosting a Science Undergraduate Laboratory Internships (SULI) intern, a program managed by the DOE Office of Science's Office of Workforce Development for Teachers and Scientists (WDTS). Megan Rogers is an undergraduate at Cañada College, and she plans to transfer to a research university to study chemical engineering. This summer she will be working on a project for the Accelerate Innovations FWP with Adam Hoffman. Her summer research involves assisting with setting up a gas chromatograph to detect and quantify reactants and products for the reverse water-gas shift reaction allowing product formation to be correlated to the structure of the catalyst. To determine the structure of the catalysts, she will be assisting Anastassiya Khan with X-ray characterization. Jason Jaquith is a fourth-year undergraduate student at the University of Florida studying materials science and engineering. There, they research the use of machine learning for battery applications. This summer, Jason is working with Jiyun Hong and the Co-ACCESS team to improve the productivity and application of XAS to catalysis research by helping to update and build out an XAS reference library. They will be preparing reference samples and characterizing them at SSRL in their ten weeks here at SLAC.



Wrapping up Another SCGSR Fellowship:

David Thompson, a 4th year PhD student attending the University of Arkansas, advised by Dr. Jingyi Chen completed his 6-month visit to Co-ACCESS as a DOE SCGSR fellow. His PhD work focuses on the synthesis and characterization of nickel phosphide based nanocatalysts for electrochemical oxidation reactions, such as the Oxygen Evolution Reaction (OER). During his time with Co-ACCESS, he investigated the mechanism of phosphorus insertion into the nickel lattice to form amorphous and crystalline nickel phosphides and investigated the different structural reconstruction mechanisms of nickel phosphide nanoparticles while under OER potentials using operando X-ray absorption spectroscopy. Side projects included assisting with Co-ACCESS supported beam times and testing of the new electrochemical cell.



Key Recent Publications

1. "A Versatile Electrochemical Cell for Operando XAS", L. Ostervold, A.S. Hoffman, D. Thompson, S.R. Bare, E.L. Clark, *ChemCatChem*, (2024), e202400072, DOI: [10.1002/cctc.202400072](https://doi.org/10.1002/cctc.202400072).
2. "Recommendations to Standardize Reporting, Execution and Interpretation of XAS Measurements", R.J. Meyer, S.R. Bare, G.A. Canning, J.G. Chen, P. Chu, R.J. Davis, J. Falkowski, A.S. Hock, A.S. Hoffman, A.M. Karim, S.D. Kelly, Y. Lei, E. Stavitski, C.J. Wrasman, *Journal of Catalysis*, (2024), **432**, 115369, DOI: [10.1016/j.jcat.2024.115369](https://doi.org/10.1016/j.jcat.2024.115369).
3. "Spectroscopic Determination of Metal Redox and Segregation Effects During CO and CO/NO Oxidation Over Silica-supported Pd and PdCu Catalysts", S. Kristy, S. Svadlenak, A. S. Hoffman, S. R. Bare, & K. A. Goulas, *Applied Catalysis B: Environmental*, (2024), **342**, 123329, DOI: [10.1016/j.apcatb.2023.123329](https://doi.org/10.1016/j.apcatb.2023.123329).
4. "Reduction of co-fed carbon dioxide modifies the local coordination environment of zeolite-supported, atomically dispersed chromium to promote ethane dehydrogenation", W. Zhou, N. Felvey, J. Guo, A.S. Hoffman, S.R. Bare, A. Kulkarni, R. Runnebaum, C. Kronawitter, *Journal of the American Chemical Society*, (2024), **146**, 10060-10072. DOI: [10.1021/jacs.4c00995](https://doi.org/10.1021/jacs.4c00995).

We invite any catalysis researcher to contact us prior to submitting a proposal to SSRL, or prior to their upcoming experiment. We can advise you at the appropriate level with the expressed aim of trying to maximize the success of your time at SSRL. We look forward to collaborating with you!

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<https://www-ssrl.slac.stanford.edu/content/science/chemistry-catalysis>