ASU Department of Physics
Arizona State University

COLLOQUIUM

Thursday, September 9th, 2021

4:00 PM – 5:00 PM, Virtual
https://asu.zoom.us/j/86960690591

Single-Atom Catalysis for Energy, Environment, and Sustainability

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Abstract:

Catalysis has been playing an essential role in the solutions to major problems that our society faces: energy production, environment remediation, and improving the quality of life. Improvement in catalytic technologies has been essential for a sustainable modern society. A catalyst lowers the energy cost of transforming molecules and modifies the reaction pathways toward the desired final product distribution of a chemical reaction. The fact that supported single metal atoms can do catalysis provides unparalleled opportunities for developing innovative technologies for a sustainable and greener chemical industry [1-3]. Single-atom catalysts (SACs) not only maximize the utilization efficiency of expensive metals of rare resources but also have a great potential to significantly improve selectivity and activity of targeted catalytic reactions, and lower the cost of manufactured goods. Since our first publication on single-atom catalysis a decade ago [1] this frontier research field has grown explosively, especially for potential new technologies that provide alternative routes to climate change by significantly reducing greenhouse gas emissions [2-3]. This talk will introduce the concept of single-atom catalysis, the fundamental understanding of SACs, and the potential applications of SACs in developing greener technologies for sustainable production of energy and essential chemicals.

[1] B. Qiao et al., Single-atom catalysis of CO oxidation using Pt_1/FeO_x. *Nature Chem* **3**, 634–641 (2011). https://doi.org/10.1038/nchem.1095.
[2] J. Liu, Catalysis by supported single metal atoms. *ACS Catal.* **7**, 34–59 (2017). https://doi.org/10.1021/acscatal.6b01534.
[3] J. Liu, Single-atom catalysis for a sustainable and greener future. *Curr. Opin. Green Sustain. Chem.* **22**, 54-64 (2020). https://doi.org/10.1016/j.cogsc.2020.01.004.

Biography:

Jingyue (Jimmy) Liu is a Professor in the Department of Physics at Arizona State University (ASU). He completed a BS degree in materials physics at University of Science and Technology Beijing and Ph.D. in physics at ASU. He was a Senior Science Fellow at Monsanto Company (1994-2006), and Professor of Physics and Chemistry and Director of the Center for Nanoscience at University of Missouri-St. Louis (2006-2011). He is a Fellow of the Microscopy Society of America. His research focuses on heterogeneous catalysis, advanced electron microscopy, and nanoscience.

Host: Prof. David Smith

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