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**Mechanistic Interactions at Scale in Energy Storage**

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**Abstract:** Advances in electrical energy storage systems are critical for vehicle electrification, renewable energy integration into the electric grid, and electric aviation. Recent years have witnessed an urgent need to accelerate innovation toward realizing improved and safe utilization of high energy and power densities, for example, in lithium-ion and advanced battery chemistries. These are complex, dynamical systems that include coupled processes encompassing electronic, ionic, and solid-state diffusive transport, electrochemical reactions at electrode/electrolyte interfaces, mechanical stress generation, and thermal transport in porous electrodes. This presentation will highlight the importance of the underlying mechanistic interactions at scale in the design of novel paradigms in exemplar energy storage architectures.

**Biographical Sketch:** Partha P. Mukherjee is a Professor of Mechanical Engineering and a University Faculty Scholar at Purdue University. His prior appointments include Assistant Professor and Morris E. Foster Faculty Fellow of Mechanical Engineering at Texas A&M University (2012-2017), Staff Scientist at Oak Ridge National Laboratory (2009-2011), Director's Research Fellow at Los Alamos National Laboratory (2008-2009), and Engineer at Fluent India (currently Ansys Inc., 1999-2003). He received his Ph.D. in Mechanical Engineering from Pennsylvania State University in 2007. His awards include Scialog Fellows' recognition for advanced energy storage, University Faculty Scholar and Faculty Excellence for Early Career Research awards from Purdue University, The Minerals, Metals & Materials Society Young Leaders Award, and invited presentations at the U.S. National Academy of Engineering Frontiers of Engineering symposium and Gordon Research Conference – Batteries, to name a few. His research interests are focused on mesoscale physics and stochastics of transport, chemistry, and materials interactions, including an emphasis on the broad spectrum of energy storage and conversion.

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