

**DESIGNING BETTER MATERIALS FOR FUTURE BATTERIES**

**Y. SHIRLEY MENG, PhD**

**Professor of Molecular Engineering**  
The University of Chicago



**Abstract:** High energy long life rechargeable battery is considered as key enabling technology for deep de-carbonization. Energy storage in the electrochemical form is attractive because of its high efficiency and fast response time. Besides the technological importance, electrochemical devices also provide a unique platform for fundamental and applied materials science & research since ion movement is often accompanied by inherent complex phenomena related to phase changes, electronic structure changes and defect generation. In this plenary talk, I will discuss a few new perspectives for energy storage materials including new superionic conductors, new intercalation compounds and their interfacial engineering. With recent advances in photon and electron characterization tools and computational methods, we are able to explore ionic mobility, charge transfer and phase transformations in electrode and electrolyte materials in operando, and map out the structure-properties relations in novel functional metals, ceramics and gaseous materials for next generation energy storage and conversion. Moreover, I will discuss a few future priority research directions for electrochemical energy storage.

**Bio:** Dr. Y. Shirley Meng received her Ph.D. in Advance Materials for Micro & Nano Systems from the Singapore-MIT Alliance in 2005. She held the Zable Chair Professor in Energy Technologies at University of California San Diego (UCSD) from 2017-2022. Dr. Meng is currently a Professor at the Pritzker School of Molecular Engineering. She serves as the Chief Scientist of the Argonne Collaborative Center for Energy Storage Science (ACCESS) Argonne National Laboratory. Dr. Meng is the principal investigator of the research group - Laboratory for Energy Storage and Conversion (LESC). Dr. Meng received several prestigious awards, including the Faraday Medal of Royal Chemistry Society (2020), International Battery Association Battery IBA Research Award (2019), Blavatnik Awards for Young Scientists Finalist (2018), American Chemical Society ACS Applied Materials & Interfaces Young Investigator Award (2018), C.W. Tobias Young Investigator Award of the Electrochemical Society (2016) and NSF CAREER Award (2011). Dr. Meng is elected Fellow of Electrochemical Society (FECS), Fellow of Materials

Research Society (FMRS) and Fellow of American Association for the Advancement of Science (AAAS). She is the author and co-author of more than 270 peer-reviewed journal articles, two book chapters and five issued patents. she is the Editor-in-Chief for Materials Research Society MRS Energy & Sustainability