

Mixed Ionic-Electronic Conductors for Electrochemical Energy Storage

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Mixed (ion-electron) conductors are solid materials that conduct both ionic and electronic carriers. This presentation will focus on how the fundamentals of mixed conductors could play a key role in determining the performance of lithium batteries. Besides introducing the conventional homogeneous mixed conductors, we will present the recent research on charge storage and transport in multi-phase composite electrodes in batteries. Examples will cover practical electrodes comprising mixed ion-electron conductors and conductive additives such as solid electrolytes and electronically conductive carbon. The electrochemical transport in such a heterogeneous system is complex and hard to analyze by using the traditional treatment developed for homogeneous electrodes. In this contribution, we will report a comprehensive toolkit to theoretically and experimentally describe the complex transport phenomena of charge species in practical battery electrodes. The finding of this study can pave the way for developing all-solid-state electrochemical cells reconciling energy density and power density.

Speaker biography



Chia-Chin Chen received his B.S. from National Taiwan University and his M.S. from Illinois Institute of Technology. He completed the Ph.D. degree in chemistry at Max-Planck Institute for Solid State Research and pursued the postdoctoral training in materials science at Stanford University. He is currently the assistant professor in the Department of Chemical Engineering at National Taiwan University. His research interests include fundamental aspects of charge transport in electrochemical and semiconductor devices.