

Connecting Battery Components: Advanced Binder Designs for Emerging Rechargeable Batteries

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Although Lithium-ion batteries (LIBs) have been greatly successful as power sources of in various applications, they are evolving continuously for further improved performance in many aspects, particularly in the transportation sector. All-solid-state-batteries (ASSBs) are drawing discernable attention due to their superior safety. In particular, in response to this trend related to those emerging batteries, new binder designs are demanded. In the first part of this talk, I will present advanced binder designs for LIB electrodes that undergo huge volume change. Such binder designs emphasize a principle relying on supramolecular chemistries, including hydrogen interaction, ion-dipole interaction, and ring-sliding motion in molecular machines. In the second part of this talk, I will introduce some binder designs targeting sulfide-based ASSBs. I will first introduce the difficulty of finding solvent-binder pairs compatible with sulfide electrolytes and will then cover our recent process on how to avoid the given problem. Along this direction, I will introduce binder designs based on click and deprotection chemistry.