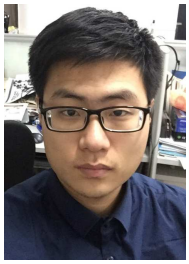
ChemPubSoc Europe

DOI: 10.1002/batt.201900206

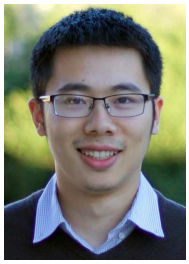
BATTERIES & SUPERCAPS
Cover Profile

A Supramolecular Electrolyte for Lithium-Metal Batteries


Jin Xie


Bo-Quan Li


Yun-Wei Song


Hong-Jie Peng


Qiang Zhang

Invited for this month's cover picture is the group of Prof. Qiang Zhang. The cover picture exhibits the concept of a supramolecular electrolyte (SSE) in lithium metal batteries. Supramolecular organization affords the ion channel (represented by the bridge) towards the lithium metal electrode (represented by the flaring mountain). Structural units cucurbit[6]uril are shown as streetlights along the ion channel to enlighten Li^+ (the vehicles) moving from/to the lithium metal electrode. With the supramolecular ion channel to connect the lithium electrode and to regulate the coordination environments, Li^+ transportation is boosted, displaying high mobility in the electrolyte and comparable activity at the electrode–electrolyte interface. The supramolecular design of solid electrolyte not only affords an emerging family of electrolyte candidate for lithium metal batteries, but also inspires the mediation of ion transportation and interfacial properties in energy storage systems. Read the full text of the Communication at 10.1002/batt.201900112.

What is the most significant result of this study?

The most significant result is the successful development of an electrolyte by supramolecular interactions for Li metal batteries, which displayed high bulk and interfacial ion conductivity simultaneously.

What prompted you to investigate this topic/problem?

The urgent requirements of advanced energy storage systems prompted our investigation on emerging electrolytes. Lithium metal battery is regarded as one of the most promising energy storage systems to cover the demands of future technologies. However, it suffers from safety and stability problems, which are our biggest concerns.

What new scientific questions/problems does this work raise?

The work raised new scientific questions about the chemical interactions and material design of supramolecular electrolyte. For instance, which supramolecular interaction is preferred to construct ion channels and to regulate lithium ion transportation? How can we achieve a better supramolecular electrolyte for lithium metal batteries with higher ionic conductivity and cycling stability?

What other topics are you working on at the moment?

We are working on the material and chemistry of energy storage systems generally. Lithim-sulfur batteries, lithium metal batteries, and bifunctional oxygen electrocatalyst are among our ongoing projects.