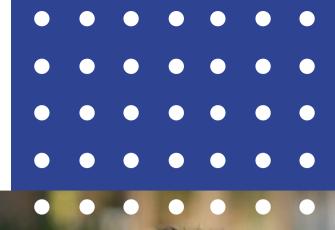


## **Chunsheng Wang**

## Center for Research in Extreme Batteries University of Maryland

Electrolytes for high energy Li-ion and Li metal batteries

Electrolytes are critical enabling components for Li-ion batteries to safely operate within a wide temperature range, under extreme fast charging, and under intense abuse conditions without sacrificing energy density and cycle life. Current electrolytes cannot satisfy these requirements. We developed advanced all-fluorinated electrolytes, water-in-sale (WIS) electrolytes and solid-state electrolytes aiming to simultaneously enhance cell energy density and safety. Guided by the electrolyte design principle for highcapacity electrodes with large volume changes, we developed serval organic liquid electrolytes suitable for micro-sized Si and Li metal anodes and NMC cathodes. We also reduced the salt concentration of water-in-salt electrolytes from 21 m to 4.5m and extended the electrochemical stability window from 3.0V of WIS to 3.4V. These improved electrolytes enable LiMn2O4/Li4Ti5O12 pouch cells with an areal capacity of 2.5 mAh/cm2 and a P/N capacity ratio of 1.14 to achieve a long cycle life of 500. For solid state electrolyte Li metal batteries, we suppressed the Li dendrite growth and reduced the interface resistance by constructing a lithionphobic-lithiophoilic interlayer between solid electrolyte and Li metal anodes. The critical role of solid electrolyte interphase in accommodating electrode volume changes was also investigated.





For Zoom Info Email: dmse@jhu.edu



**Materials Science and Engineering**