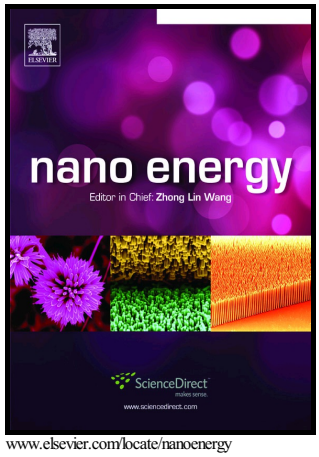

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Boosting the Performance of Lithium Batteries with Solid-Liquid Hybrid Electrolytes: Interfacial Properties and Effects of Liquid Electrolytes

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Abstract

Solid-state lithium batteries have attracted significant attention recently due to their superior safety and energy density. Nevertheless, the large interfacial resistance has limited the development of SSLBs. To tackle this problem, a general strategy is to add liquid electrolytes (LE) at the interface to form a solid-liquid hybrid electrolyte. However, the effects and interfacial properties of LE in the solid-liquid hybrid electrolyte have not been well-understood. In this work, we quantitatively add LE at the interface to eliminate the large interfacial resistance and study its interfacial properties. As little as 2 µl of LE at the interface enables a hybrid $LiFePO_4$\LATP\Li battery to deliver a specific capacity of 125 mAh g^{-1} at 1C and 98 mAh g^{-1} at 4C. Excess LE has no further contribution to the electrochemical performance. Furthermore, the rigid SSE could suppress the formation of lithium dendrites,