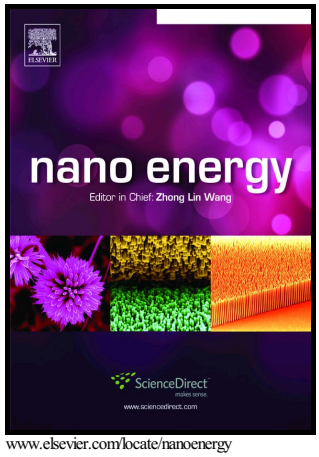


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# Plateau Targeted Conditioning: An Additive-Free Approach towards Robust SEI Formation in Li-S Batteries for Enhanced Capacity and Cycle Life

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## Abstract

Lithium-sulfur (Li-S) is one of the most promising next-generation lithium-ion battery systems due to its high theoretical specific capacity. However, Li-S batteries suffer from a short cycling life, poor mechanical stability and low coulombic efficiency. Developing a robust solid electrolyte interphase (SEI) plays a critical role in alleviating these issues. Current approaches for a robust SEI are mostly based on using additives, which negatively impact the energy density. Herein, newly developed electrochemical conditioning techniques were applied to study their effects on the formation of the SEI in Li-S batteries. The dynamic mechanisms in the battery associated with each conditioning technique were investigated using city and highway models based on real world driving conditions. City and highway models incorporated various electrochemical characterization techniques while introducing varying levels of cycling stress. As an additive free approach, the novel plateau targeted conditioning method improves Li-S SEI formation that increases battery capacity and cycling stability. This work will pave the way for the realization of additive free approaches to improving the performance of Li-S batteries.

[1] *These authors contributed equally to this work.*