

## WO<sub>3</sub> Nanowire/Carbon Nanotube Interlayer as a Polysulfide Mediator for High-Performance Lithium-Sulfur Batteries

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Although lithium-sulfur batteries are one of the most promising energy storage devices owing to their high energy densities, the sluggish reaction kinetics and severe shuttle effect of the sulfur cathodes hinder their practical applications. Here, we developed a new nanowire for enhancing the performance of lithium-sulfur batteries. WNWs and one-dimensional materials are easily mixed with carbon nanotubes (CNTs) to form interlayers. The WNW interacts with lithium polysulfides through a thiosulfate mediator, retaining the lithium polysulfide near the cathode to improve the reaction kinetics. The lithium-sulfur cell delivered a very high initial discharge capacity of 1558 and 656 mAh g<sup>-1</sup> at 0.1 and 3 C, respectively. Moreover, a cell with a high sulfur mass loading of 4.2 mg cm<sup>-2</sup> still delivers a high capacity of 1136 mAh g<sup>-1</sup> at a current density of 0.2 C and it showed a capacity of 939 mAh g<sup>-1</sup> even after 100 cycles. The WNW/CNT interlayer maintains structural stability even after electrochemical testing. This excellent performance and structural stability are due to the chemical adsorption and catalytic effects of the thiosulfate mediator on WNW.