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## Zinc acetate activation-enhanced performance of hollow nano silica/carbon composite nanofibers for lithium-sulfur batteries

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### Abstract

Here we develop a facile and scalable method to prepare silica/activated carbon nanofibers (SiO<sub>2</sub>/ACNFs) via electrospinning a mixture of PAN and hollow SiO<sub>2</sub> nanospheres with following heat treatment, during which Zn(CH<sub>3</sub>COO)<sub>2</sub> activation and PAN carbonization are simultaneously completed. When applied in lithium sulfur battery, the coin cells using S/SiO<sub>2</sub>/ACNF composites as cathode material exhibit a high discharge specific capacity and long cycling life. The specific capacity at 0.5 and 1 C rates after 300 cycles still remains at 584 and 513 mAh g<sup>-1</sup>, respectively, and the corresponding capacity decay is just 0.09% at 0.5 C and 0.13% at 1 C per cycle. The Zn(CH<sub>3</sub>COO)<sub>2</sub> activation benefits sulfur loading and volume expansion suppression by creating numerous hierarchical pores in carbon nanofibers. Additionally, hollow SiO<sub>2</sub> nanospheres contribute to restrain the “shuttle effects” by adsorbing and releasing polysulfides reversibly. This kind of SiO<sub>2</sub>/ACNF material and its fabrication method hold high potential for Li-S battery.

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