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Nano potassium phosphotungstate spheres/sulfur composites as cathode for Li-S Batteries

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Abstract:

Herein, a new strategy of using polyoxometalates($\text{K}_3\text{PW}_{12}\text{O}_{40}$) to stabilize sulfur was introduced for the first time for Li-S batteries. The as prepared $\text{K}_3\text{PW}_{12}\text{O}_{40}$ spheres/S electrode shows a initial discharge capacity of $1281.0 \text{ mAh g}^{-1}$ with a good cycling stability at a rate of 0.1 C. In particular, the $\text{K}_3\text{PW}_{12}\text{O}_{40}$ /S electrode exhibits an initial specific capacity of 810.0 mAh g^{-1} at a high current rate of 2 C, and remains 560.4 mAh g^{-1} after 250 cycles. The excellent performances are attributed to the significant roles that $\text{K}_3\text{PW}_{12}\text{O}_{40}$ host played during the charge/discharge process.

Keywords:

Lithium sulfur batteries; Potassium phosphotungstate spheres; Nanocomposites;
Energy storage and conversion

1. Introduction

Lithium-sulfur batteries have been considered as the most likely alternatives to Li ion batteries, owing to the high energy density of 2600 Wh kg^{-1} [1, 2]. However, several inherent problems still limited the commercial application of Li-S battery, such as high dissolution of polysulfides, the reaction between lithium anode and the dissolved polysulfides, and low electric/ionic conductivity of sulfur[3-5]. To

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