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Preparation of Reduced Graphene Oxide Aerogel and its Application in Lithium Sulfur Battery

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A facile method was used to prepare novel nitrogen-doped sulfur-based compound material coated with reduced-graphene-oxide aerogel NCNT/S(RGO-gel) composite. As coating layer, the material was systematically studied through X-ray diffraction, scanning electron microscopy, Fourier transform infrared spectroscopy, and electrochemical test. NCNT/S(RGO-gel) electrode showed first discharge specific capacity of 1403.7 $mAh \cdot g^{-1}$ under 500 mA/g density. The material also exhibited outstanding rate capability and long-term cycle stability. Results showed that RGO-gel coated composite electrode retained its discharge specific capacity of 912.4 mAh/g after 175 cycles under 500 mA/g current density. The composite electrode presented capacity retention rate of 80%. Improved electrochemical performance was mainly ascribed to RGO-gel, which not only reduced dissolution of sulfur polymer (S_n^{2-}) but also significantly improved conductivity. NCNT also served as bridge between RGO-gel layers, significantly shortening the path for lithium-ion transport. Thus, novel NCNT/S(RGO-gel) composite can act as potential positive electrode for high performance Li–S batteries.

Keywords: RGO-gel, coating layer, Li-S battery, electrochemical performance

FULL TEXT