Optimized Preparation of Polyacrylonitrile/Sulfur Composite as Cathode for Lithium Sulfur Batteries

Jiaxin Pan^{1,2}, Jia Nie¹, Bing Zeng³, Xianbiao Chen³, Zhe Chen³, Dongqi Kang³, Yinbao Miao³, Weihao Liu³, Wenhua Zhang^{3,*}

¹ College of Chemistry & Molecule Science, Wuhan University, Bayi road No.299, Wuhan 430072, China

² Guangxi Institute of science and technology information, Xinghu road No.24, Nanning 530022, China

³ Nanchang Institute of Technology, Tianxiang Avenue No.289, Nanchang 330099, China

*E-mail: 2015994552@nit.edu.cn

Received: 20 September 2021 / Accepted: 22 October 2021 / Published: 5 January 2022

The polyacrylonitrile/sulfur (PAN/S) composite was prepared by heating the mixture of polyacrylonitrile (PAN) and sulfur under sealed conditions. The effects of the ratio of raw materials, reaction temperature, reaction time and reaction container volume on the properties of the composite product were studied to optimize the preparation conditions of the PAN/S composite. The results showed that the PAN/S composite with the mass ratio of 1:1.5 had the best properties, which was prepared in a large container in a high temperature reaction kettle at 300°C-400°C for 12 hours. Based on the total mass of the composite, the initial discharge capacity of the composite is 856 mAh g⁻¹ and the reversible specific capacity is 678 mAh g⁻¹. After 100 cycles, the specific capacity of the composite is stable at 584 mAh g⁻¹, and the capacity retention rate is 86.1 %, showing a good application prospect.

Keywords: Li-S battery, sulfur cathode, PAN/S composites

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