

High-Performance Li–S Batteries with a Ketjenblack–rGO Coated Separator

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Lithium–Sulfur (Li-S) batteries are considered to be one of the most promising next-generation battery systems, due to its high theoretical energy density in comparison to conventional lithium-ion batteries. However, the practical application is hampered by their poor cycle life and low rate performance, which is mainly attributed to the dissolution of polysulfides, shuttle effect and insulating nature of S [1,2].

Here, we designed a Ketjenblack–rGO composite coated separator, prepared via simple slurry coating, to address these problems. The Ketjenblack–rGO coated separator acted as the upper current collector to effectively facilitate electron transport and reduce the impedance of battery. Meanwhile, it could improve the cycle performance by taking advantage of the functional groups of reduced graphene oxide to chemically bond polysulfides and the porous structure of Ketjenblack to physically block polysulfides. As a result, with the Ketjenblack–rGO composite coated separator, the batteries exhibits superior cycle performance, maintaining excellent capacity retention of 83.1% after 1000cycles at the rate of 1C. Compared to the pristine separator, the modified separator showed 1.6 times higher initial capacity (727.2 mAhg^{-1}) than cells with pristine separator (442 mAh g^{-1}).

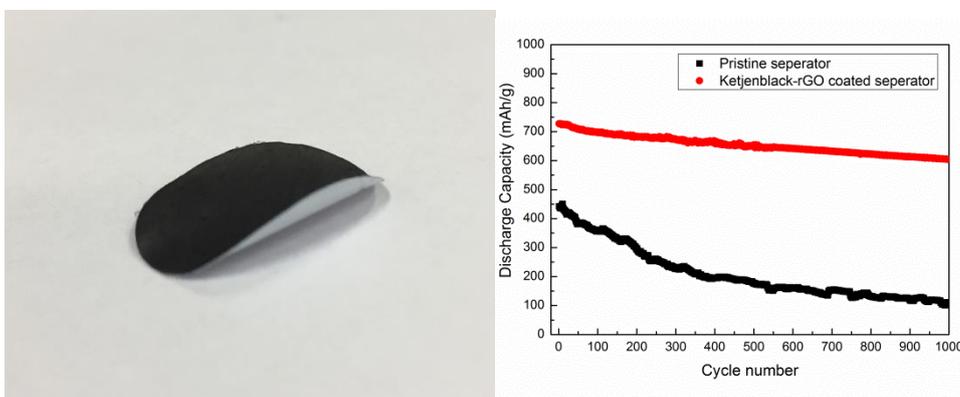


Fig 1 The Ketjenblack-rGO coated separator(left) and the cycle performance of Li-S cells with Ketjenblack-rGO coated separator and pristine separator at 1C(right)

References:

- [1] W. Lin, Y.F Chen, P.J Li, J.R. He, Y. Zhao, Z.G Wang, J.B. Liu, F. Q, B.J. Zheng, J.H. Zhou, C. Xu, F. Fu, *J. Electrochem. Soc.* 162 (2015) A1624–A1629.
- [2] X.Y. Qian, L.N. Jin, D. Zhao, X. L. Yang, S.W. Wang, X.Q. Shen, D.W. Rao, S.S. Yao, Y.Y. Zhou, X.M. Xi, *Electrochim. Acta* 192 (2016) 346–356.