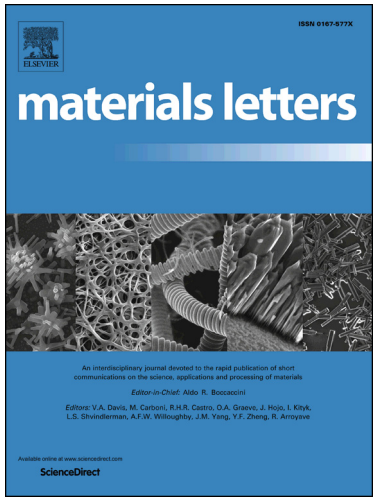

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Rational synthesis of MnO_2@CMK/S composite as cathode materials for lithium–sulfur batteries

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Lithium–sulfur batteries with a high energy density are promising energy storage devices. The realization of lithium–sulfur batteries is mainly hindered by the dissolution of the intermediate polysulfides. In the present work, a new physical and chemical entrapment method of the polysulfides has been proposed, which used CMK-3 as the carbon scaffolds and a MnO_2 coating layer for chemisorption. Such a bi-functional framework provides efficient trapping for the polysulfides, achieving a reversible capacity of 600 mAh g^{-1} after 100 cycles at 0.1 C with a 73.4 wt.% sulfur loading in the composite.

Keywords: Lithium–sulfur battery; CMK; MnO_2; surface-adsorption induced deposition.

1. Introduction

The development of advanced rechargeable batteries with a high energy density and high safety has become increasingly important for the clean and efficient energy conversion and storage applications. Lithium–sulfur (Li–S) batteries have attracted great enthusiasm due to the high specific energy which is two-fold higher than that of the commercial lithium ion batteries [1-3]. However, it is difficult to achieve a high capacity and a long practical cycle life of the battery due to the insulating nature of sulfur compounds, the dissolution of polysulfide intermediates into electrolyte and the consequent shuttling effect between the anode and the cathode.

Over the past decades, the most common strategy is using carbon scaffold such as mesoporous carbon and