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High capacity and cycle stability Rechargeable Lithium–Sulfur batteries by sandwiched gel polymer electrolyte

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Abstract

A novel sandwiched gel polymer electrolyte(GPE) was prepared using a facile method as separator solely for rechargeable Lithium–Sulfur batteries. As a result of the strong physical shielding and chemical absorption of GPE, the separator can not only suppress shuttle effect in ether-based electrolyte, but also improve utilization of sulfur significantly resulting in a high capacity. The PVDF layers could absorb ether-based electrolyte largely and then enhance Li^+ transfer; the PMMA layer can be utilized to trap the dissolved polysulfides. Lithium–Sulfur batteries with the sandwiched GPE separator shows an encouraging electrochemical performance. A high initial discharge capacity of $1711.8 \text{ mAh g}^{-1}$ is obtained, and the capacity retains at $1145.3 \text{ mAh g}^{-1}$ after 50 cycles at 200 mA g^{-1} , which is higher than that of the cell

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