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Porous hollow spherical $\text{Mg}_{0.6}\text{Ni}_{0.4}\text{O}/\text{S}$ composite as cathode material for Li-S batteries

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Abstract

Porous hollow $\text{Mg}_{0.6}\text{Ni}_{0.4}\text{O}$ has been fabricated by simple solvothermal method and removed the template by calcining. Afterward, taking advantage of liquid infiltration method, we have successfully synthesized hollow $\text{Mg}_{0.6}\text{Ni}_{0.4}\text{O}/\text{S}$ as positive material for Li-S battery with a sulfur loading of 59.9 wt%. Porous hollow structure not only promoted the electron transfer, but also mitigated the expansion of element sulfur in the process of charging and discharging. Under a current density of 200 mA g^{-1} , the reversible capacity was up to 912 mAh g^{-1} after 65 cycles with a high rate performance, coulombic efficiency and a capacity retention of 98%. Especially, at a higher current density of 4000 mA g^{-1} , the reversible capacity maintained at 174.5 mAh g^{-1} after 500 cycles. The excellent electrochemical performance was owe to $\text{Mg}_{0.6}\text{Ni}_{0.4}\text{O}$ alleviated polysulfide dissolution in electrolyte and had unique catalytic effect on the Li/S redox reactions.

Keywords: Li-S battery; $\text{Mg}_{0.6}\text{Ni}_{0.4}\text{O}$; Hollow; Metal oxide

1. Introduction

Compared¹with traditional Li-ion batteries, Lithium Sulfur battery has become one of research hotspots in lithium secondary batteries for higher specific capacity (1675

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