

# A simple approach to synthesize novel sulfur/graphene oxide/multiwalled carbon nanotube composite cathode for high performance lithium/sulfur batteries

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## Abstract

A sulfur/graphene oxide/multiwalled carbon nanotube (S/GO/MWNT) composite was synthesized via a simple ultrasonic mixing method followed by heat treatment. By taking advantage of this solution-based self-assembly synthesis route, poisonous and noxious reagents and complicated fabrication processes are rendered unnecessary, thereby simplifying its manufacturing and decreasing the cost of the final product. Transmission and scanning electronic microscopy observations indicated the formation of the three-dimensional interconnected S/GO/MWNT composite through the environmentally friendly process. The GO layers and long MWNTs synergistically constructed hierarchical electron/ion pathways, favoring the ion transport and electrolyte diffusion. The interlaced network can serve as sponges to physically absorb polysulfides to their wrinkled surface and porous structure. In addition, GO could confine the polysulfides' dissolution through chemical absorption by the functional groups on GO layers. Therefore, the resulting S/GO/MWNT composite exhibits good rate capability and highly stable specific discharge capacity of 773 mA h g<sup>-1</sup> after 100 cycles at 0.1 C.

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