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## **A novel CoS<sub>2</sub>/reduced graphene oxide/multiwall carbon nanotubes composite as cathode for high performance lithium ion battery**

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### **Abstract**

To improve the electrochemical performance of the CoS<sub>2</sub> cathode, a CoS<sub>2</sub>/reduced graphene oxide/multiwall carbon nanotubes (CoS<sub>2</sub>/rGO/MWCNTs) composite was synthesized. The mixture showed a high initial discharge capacity of 1562.6 mAh g<sup>-1</sup> and a capacity of 884.9 mAh g<sup>-1</sup> after 100 cycles at the current density of 100 mA g<sup>-1</sup> which were higher than that of CoS<sub>2</sub>/rGO and CoS<sub>2</sub>/MWCNTs. The improved electrochemical performances were attributed to rGO and MWCNTs which ensured fast Li<sup>+</sup> and electronic transport in the composite. What's more, rGO sheets wrapping tightly outside CoS<sub>2</sub>/MWCNTs in CoS<sub>2</sub>/rGO/MWCNTs composite accommodated volume expansion of CoS<sub>2</sub> and prevented CoS<sub>2</sub> gathering.

**Keywords:** rGO, MWCNTs, CoS<sub>2</sub>, Electrochemical performances

### **Introduction**

Nowadays, kinds of green energy such as solar power, wind power and tidal power have become optional substitutes for petroleum and coal. For energy storage, lithium ion battery has been studied for decades since it is first assembled by Whittingham<sup>1</sup> and is attracting more and more concerns due to the high energy density and the environmentally friendly property.<sup>2-6</sup> In the studies of lithium ion batteries, metal sulfides cathodes have attracted much attention because of

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