



Na_{2.5}Fe_{1.75}(SO₄)₃/Ketjen/rGO: An advanced cathode composite for sodium ion batteries



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HIGHLIGHTS

- Advanced cathode composite.
- Na_{2.5}Fe_{1.75}(SO₄)₃/Ketjen/rGO.
- Good rate capability.
- Great cycling stability.
- SEI layer.

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ABSTRACT

An advanced cathode composite Na_{2.5}Fe_{1.75}(SO₄)₃/Ketjen/rGO for sodium ion batteries has been prepared, joining together the excellent electrochemical properties of the three components: off stoichiometric iron sulfate alluaudite, Ketjen Black carbon and reduced graphene oxide (rGO).

This electrode material has been exhaustively characterized by XRD, thermogravimetric analysis, Raman spectroscopy and SEM and TEM microscopy. The study has demonstrated that a high quality electrode material has been designed containing a porous sulfate core properly coated by interweaved rGO fibers and Ketjen Black nanoparticles. The electrochemical study has revealed an excellent performance providing specific capacities close to the theoretical one at 1C. Additionally, this composite has shown a very good rate capability and a great cycling stability for at least 200 cycles maintaining a coulombic efficiency of 96%.

The post mortem analysis, which includes EPR and XPS measurements, has demonstrated that the carbonaceous coating on the composite generates a stable and protective SEI layer over the active material guaranteeing a successful performance during a long cycle life.

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