

Capacity and charge-transport enhancement of LFP/RGO by doping with α -MnO₂ in a microwave-assisted synthesis

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ABSTRACT:

Manganese-doped lithium iron phosphate (LFMP), coated with reduced graphene oxide (RGO), has been prepared by a microwave-assisted solvothermal technique. The un-doped lithium iron phosphate material with RGO (i.e., LFP/RGO) gave a rod-like morphology (> 200 nm in length), while the LFMP/RGO gave a sponge-like spherical morphology (\geq 100 nm diameter). This dramatic change in morphology upon doping with Mn from α -MnO₂ resulted in improved coin cell performance in terms of capacity, coulombic efficiency and charge-transfer properties. The increased performance can be attributed to improved particle size and higher surface area owing to the partial substitution of Mn ions for Fe ions. LiFe_{0.8}Mn_{0.2}PO₄ synthesised using microwaves provides a quicker method of synthesis while providing a cathode material with a promising capacity.