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Electrode Performance of Carbon Coated Nanograined LiFePO4 in Lithium Batteries

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Abstract : Lithium iron phosphate (LiFePO4) is a potential cathode material for lithium-ion batteries due to its promising characteristics. In this study, carbon-coated nanograined LiFePO4 is synthesized via wet chemistry method at a low temperature of 400 °C and investigated its performance as a cathode in Lithium battery. The X-ray diffraction pattern of the synthesized samples can be indexed to an orthorhombic LiFePO4 structure. Agglomerated particles that range from 200 nm to 300 nm are observed from scanning electron microscopy images. Transmission electron microscopy images confirm the crystalline structure of LiFePO4 and coating of amorphous carbon layer. Elemental mapping using Energy dispersive spectroscopy analysis revealed the homogeneous dispersion of Fe, P, O, and C elements. On the other hand, the electrochemical performances of the synthesized cathodes were investigated using cyclic voltammetry, galvanostatic charge/discharge tests with different C-rates, and cycling performances. Galvanostatic charge and discharge measurements revealed that the sample sintered at 400 °C for 3 hours with carbon coating demonstrated the highest capacity among the samples which reaches up to 160 $mAhg^{-1}$ at 0.1C rate.

Keywords : cathode, charge-discharge, electrochemical, lithium batteries
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