Electrochemical performance of solid-state synthesized LiMn0.8Fe0.2PO4 in lithium-ion batteries

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This work represents synthesis of LiMn0.8Fe0.2PO4 (LMFP) as a potential cathode for high-voltage lithium-ion batteries by employing a modified solid-state method. PAN based gel polymer electrolyte has been incorporated to fabricate coin cells with LMFP and lithium metal as cathode and anode respectively, that assist in displaying improved physical and electrochemical performance. The gel polymer electrolyte not only improves the stability of the lithium metal anode, but also improves the characteristics of the high voltage LMFP cathode. Preparation of LMFP has been ascertained through various characterization such as X-ray diffraction (XRD), field-emission scanning electron microscope (FE-SEM) along with energy dispersive spectroscopy (EDS) etc. and charge-discharge studies were performed to analyse their electrochemical features. Excellent electrochemical performance has been exhibited by the LMFP cathode, with an initial discharge capacity of 143.3 mAh g-1 at 0.1 C that is sustained even after 55 cycles of charging and discharging.