

Magnetic and Dielectric Properties of LiFePO_4

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A LiFePO_4 was prepared using the ball milling. The X-ray diffraction patterns of the sample were measured, and the results confirmed that the sample's structure was orthorhombic with space group *Pnma*. The particle size and morphology of the sample prepared by the ball mill method confirmed by FE-SEM. The magnetization curves of the sample were measured using a vibrating sample magnetometer at temperatures of 4.2 to 295 K at 1000 Oe. The Néel temperature (T_N) and spin-reorientation temperature (T_S) were found to be 51.5 and 25 K, respectively. We investigated the magnetic hyperfine interaction using Mössbauer spectrometry at various temperatures between 4.2 and 295 K. At temperatures below T_N , the Mössbauer spectra of the sample were exhibited eight absorption lines resulting from the magnetic dipole and electric quadruple interaction. The Fe ions state of sample at all temperatures were found to be ferrous state (Fe^{2+}) ions. Debye temperature (θ_D) of 433 ± 5 K was obtained for the sample. The permeability and permittivity were obtained using a Network analyzer.

Keywords : Mössbauer, magnetic properties, ball mill method, Li-ion batteries