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WED-SP-P13

Magnetic and Structural Properties of $LiMn_{1/3}Fe_{1/3}Ni_{1/3}PO_4$

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Magnetic and Structural Properties of $LiMn_{1/3}Fe_{1/3}Ni_{1/3}PO_4$

Soyeon Barng*, In Kyu Lee* and Chul Sung Kim*
* Department of Physics, Kookmin University, Seoul, 136-702, South Korea

Olivine type materials (Li*M*PO4, *M* = Mn, Fe, Co and Ni) have been used as lithium battery cathodes for energy storage.[1] $LiMn_{1/3}Fe_{1/3}Ni_{1/3}PO_4$ sample was prepared by solid state reaction method. X-ray diffraction (XRD) pattern of the $LiMn_{1/3}Fe_{1/3}Ni_{1/3}PO_4$ sample showed that the structure of sample was orthorhombic with space group of *Pnma*. According to the Rietveld refinement method, the lattice parameters are a_0 = 10.2768, b_0 = 5.9943, c_0 = 4.7101 Å and V = 290.1546 $Å^3$. Both zero field cooled (ZFC) and field cooled (FC) ranging from 4.2 to 300 K were measured by vibrating sample magnetometer (VSM). Magnetic order of $Na_{0.8}Li_{0.2}FeSO_4F$ is antiferromagnetic behavior below the Néel temperature (T_N = 34 K) and it shows paramagnetic behavior above T_N. Mössbauer spectra measured from 4.2 to 300 K, also confirmed that and the spectra showed doublets due to magnetic ordering change from antiferromagnetic to paramagnetic order at T_N. The asymmetric 8-absorption lines in the Mössbauer spectra were analyzed below T_N and the electric quadrupole splitting value E_Q) of $LiMn_{1/3}Fe_{1/3}Ni_{1/3}PO_4$ is 2.98 mm/s. Isomer shift value (δ) is 1.11 mm/s at room temperature which indicates that in the $LiMn_{1/3}Fe_{1/3}Ni_{1/3}PO_4$ sample Fe is at Fe^{2+} state.

[1] S.-Y. Chung, J. T. Bloking and Y.-M. Chiang, Net. Mater. ***1****, 123 (2002).*