

# Investigation of the Magnetic properties of $\text{Li}_{0.8}\text{Na}_{0.2}\text{FePO}_4$ by using the Mössbauer Spectroscopy

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We have investigated  $\text{Li}_{0.8}\text{Na}_{0.2}\text{FePO}_4$ , a cathode material for secondary battery applications, by using X-ray diffractometry (XRD), vibrating sample magnetometry (VSM) and Mössbauer spectroscopy. The crystal structure is found to be orthorhombic with lattice parameters of  $a_0 = 10.333 \text{ \AA}$ ,  $b_0 = 6.011 \text{ \AA}$  and  $c_0 = 4.700 \text{ \AA}$ . From the temperature dependence of both the magnetization and the Mössbauer spectra, the Néel temperature is found to be  $T_N = 51 \text{ K}$  and the spin reorientation temperature to be  $T_S = 20 \text{ K}$ . The magnetic hyperfine field ( $H_{hf}$ ), electric quadrupole splitting ( $\Delta E_Q$ ) and isomer shift ( $\delta$ ) at 4.2 K are found to be  $H_{hf} = 130.50 \text{ kOe}$ ,  $\Delta E_Q = 2.63 \text{ mm/s}$  and  $\delta = 1.25 \text{ mm/s}$ .

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