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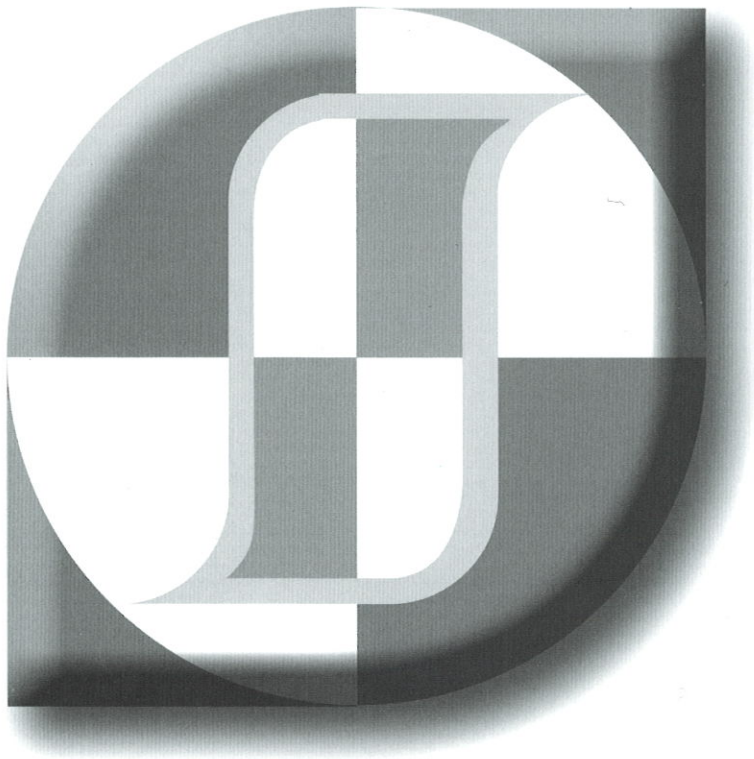
ABSTRACTS



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○ Session SA[Sensor and Applications]

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Phase transition studies of the mixed olivine $LiFe_{0.8}Zn_{0.2}PO_4$ by Mössbauer spectrosocpy

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The $LiFe_{0.8}Zn_{0.2}PO_4$ polycrystalline sample has been investigated by X-ray diffraction, vibrating sample magnetometer and Mössbauer spectroscopy. The crystal structure of the $LiFe_{0.8}Zn_{0.2}PO_4$ sample by using Rietveld refinement was determined to be orthorhombic with the space group *P*nma. The lattice constants were a_0 = 10.2918 Å, b_0 = 5.9986 Å, c_0 = 4.6949 Å, respectively. The temperature dependence of zero-field cooled(ZFC) and field-cooled(FC) magnetizaition for $LiFe_{0.8}Zn_{0.2}PO_4$ under an applied field of 1000 Oe. The Néel temperature (T_N) of the sample is determined to be 43 K. The susceptibility curve of $LiFe_{0.8}Zn_{0.2}PO_4$ indicates that the sample antiferromagnetically ordered with decreasing T_N due to Zn substitution. Also, we observed that the change in slope below the spin reorientation temperature (T_S). The value of T_S was analyzed 13 K. The Mössbauer spectra of $LiFe_{0.8}Zn_{0.2}PO_4$ were analyzed at various temperatures in order to verify the hyperfine interaction, state in terms of the Fe nucleus. The spectra of $LiFe_{0.8}Zn_{0.2}PO_4$ sample were a fitted asymmetrical 8-line pattern under T_N. The magnetic hyperfine field (H_{hf}), electric quadrupole splitting (ΔE_Q) and isomer shift (δ) values of the $LiFe_{0.8}Zn_{0.2}PO_4$ at 4.2 K were determined to be H_{hf} = 122.7 kOe, ΔE_Q= 2.74 mm/s, δ=1.24 mm/s. The polar angle (θ) is 10 °, the azimuthal angle φ = 0 °, the asymmetric parameter η = 0.8, the ratio of electric quadrupole interaction to magnetic dipole interaction R = 3.3. From these results, we can be explained that the change of Zn substitution can weaken superexchange interaction that of between the Fe ions.

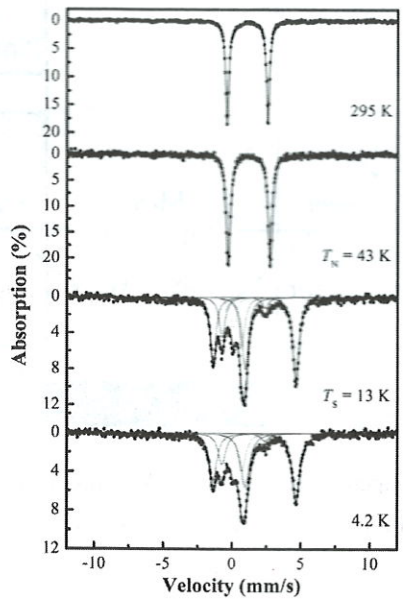

Fig. 1. Mössbauer spectra of $LiFe_{0.8}Zn_{0.2}PO_4$ at various temperature.