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ABSTRACTS

HR-06. Magnetic Property and Charge Ordering Effect in Polycrystalline LuFe_2O_4 . B. Bang¹, T. Kouh¹ and C. Kim¹. *Physics, Kookmin University, Seoul, South Korea*

We have investigated the magnetic property and charge ordering effect in LuFe_2O_4 powder with vibrating sample magnetometer (VSM) and Mössbauer spectroscopy. LuFe_2O_4 powder studied here was synthesized by the solid state reaction method. The crystal structure shows the two-dimensional layered type rhombohedral(R-3m) structure. The lattice constants are found to be $a_0=3.439 \text{ \AA}$ and $c_0=25.258 \text{ \AA}$ by Rietveld refinement. The magnetic Néel temperature (T_N) was determined to be 250 K from the magnetization curve and Mössbauer spectra. The Mössbauer spectra were taken at various temperatures ranging from 4.2 K to 370 K. Mössbauer spectra consisted of four sextets indicating the magnetic ordering below T_N and two doublets splitting in a paramagnetic region. The Mössbauer spectrum at 4.2 K was fitted in four sets of Zeeman sextet, where three sets are assumed to be Fe^{3+} phases and the other is Fe^{2+} . The spectrum at room temperature consisted of two doublet split with the electric quadrupole splitting(ΔE_Q) of $0.22\pm 0.01 \text{ mm/s}$ and $0.67\pm 0.01 \text{ mm/s}$, respectively. The isomer shift value of small doublet is $0.18\pm 0.01 \text{ mm/s}$ relative to the Fe metal that is consistent with the Fe^{3+} valence state, while the value of large doublet is $0.83\pm 0.01 \text{ mm/s}$ indicating Fe^{2+} . We note that the shape of Mössbauer spectrum starts changing from asymmetric to symmetric around 330 K. With further increasing temperature up to 370 K, two doublets are superposed and the Mössbauer spectrum becomes a symmetric single line. This suggests that the observed asymmetry below 370 K is due to the charge ordering between Fe^{3+} and Fe^{2+} in LuFe_2O_4 powder.