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PROGRAM

**CR-07. Study of Multiferroic properties of Al doped  $\text{CuFeO}_2$  by Mössbauer spectroscopy.** *D. Choi*<sup>1</sup>, *I. Shim*<sup>1</sup> and *C. Kim*<sup>1</sup>. *Physics, Kookmin University, Seoul, South Korea*

We have investigated multiferroic properties of Al doped  $\text{CuFeO}_2$  single crystal using x-ray diffraction, physical property measurement system (PPMS), magnetic property measurement (MPMS), and Mössbauer spectroscopy. The crystal structure of  $\text{CuFe}_{0.98}\text{Al}_{0.02}\text{O}_2$  is determined to be rhombohedral structure with space group of  $R\bar{3}m$ . The spontaneous electric polarization is revealed below 8 K and magnetic moment also shows kinks at 8 K. The hyperfine interactions of magnetic and electric properties of  $\text{CuFe}_{0.98}\text{Al}_{0.02}\text{O}_2$  have been characterized by Mössbauer spectroscopy. Mössbauer spectra of  $\text{CuFe}_{0.98}\text{Al}_{0.02}\text{O}_2$  have been fitted with 4-sextets below 8 K, because the magnetic structure is noncollinear incommensurate. The 4-sublattice reveals different magnetic hyperfine field and electric quadrupole splitting. Furthermore, the difference in electric quadrupole splitting can be contributed to electric polarization around Fe ions. Magnetic Néel temperature ( $T_N$ ) is determined 17 K and isomer shift values is about 0.3 mm/s at all temperatures, which are consistent with high spin  $\text{Fe}^{3+}$  charge state.

[1] S. Seki, Y. Yamasaki, Y. Shiomi, S. Iguchi, Y. Onose, and Y. Tokura, *Phys. Rev. B.*, **75**, 100403(R) (2007).