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Magnetic properties of $LuFe_2O_{4+\delta}$ FAN WANG, JUNGHO KIM, University of Toronto, G. XU, S.M. SHAPIRO, G.D. GU, Brookhaven National Laboratory, Y. LEE, Yonsei University, Y.-J. KIM, University of Toronto — $LuFe_2O_{4+\delta}$ (LFO) has been drawing much attention as a potential multiferroic compound. We show that the oxygen stoichiometry plays an important role in determining the magnetic properties of LFO. The sample with excess oxygen shows two magnetic transitions at 236K and 228K. The transition at 236K is a paramagnetic to ferrimagnetic transition, and below 228 K the system enters a spin glass phase. The DC magnetization shows strong time and history dependence, while the AC susceptibility exhibits dynamic scaling behaviour similar to that of canonical spin glass systems. This spin glass behaviour seems to disappear in the more stoichiometric sample. In this second sample, long range ferrimagnetic ordering has been observed with neutron scattering experiments. Our x-ray scattering on single crystal and x-ray powder diffraction experiments both show there is a structural change around 170K, which seems to be responsible for an observed low field anomaly. When a small magnetic field is applied, magnetization is only turned on during heating the sample. With large applied field, a metamagnetic transition was observed.

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