

Magnetic properties of $\text{Nd}_{1/3}\text{Sr}_{2/3}\text{FeO}_3$ by neutron and Mössbauer spectroscopy

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Charge transfer type $\text{Nd}_{1/3}\text{Sr}_{2/3}\text{FeO}_3$ was synthesized and its magnetic properties were investigated by neutron diffraction and Mössbauer spectroscopy at various temperatures ranging from 4.2 K to room temperature. The powder neutron diffraction shows magnetic ordering structures. The $\text{Nd}_{1/3}\text{Sr}_{2/3}\text{FeO}_3$ with small lattice distortion underwent a charge ordering (CO) phase transition at and below $T_{\text{CO}} = 163$ K corresponding to a sequence of $\text{Fe}^{+3}\text{Fe}^{+3}\text{Fe}^{+5}\text{Fe}^{+3}\text{Fe}^{+3}\text{Fe}^{+5}$ aligned along the z direction of rhombohedral, as well as canted antiferromagnetic spin ordering. The spin rotation resulting from helical spin of Nd was observed at and below 25 K. At 4.2 K, the electric quadrupole splittings for Fe^{3+} and Fe^{5+} are 0.06 and 0.15 (mm/s) which were changed to -0.06 and -0.02 (mm/s) at and above 20 K. It is evidence of spin rotation in $\text{Nd}_{1/3}\text{Sr}_{2/3}\text{FeO}_3$. © 2001 American Institute of Physics. [DOI: 10.1063/1.1361265]