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Neutron and Mössbauer studies of the double perovskite A_2FeMoO_6 (A = Sr and Ba)

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Abstract

The double perovskite oxide Ba_2FeMoO_6 has a cubic structure with $a_0 = 8.0747$ Å, whereas Sr_2FeMoO_6 has a tetragonal symmetry with $a_0 = 5.5729$ Å and $c_0 = 7.9077$ Å. The unit-cell parameters of the strontium compound increase linearly on increasing the temperature, and the crystal symmetry changes into cubic in the paramagnetic phase (above the Curie temperature T_C). Magnetization measurements show a ferrimagnetic behavior for both materials, with $T_C = 345$ K for Ba_2FeMoO_6 and $T_C = 425$ K for Sr_2FeMoO_6, respectively. As the temperature increases toward T_C, Mössbauer spectra show line broadening and 1, 6 and 3, 4 linewidth difference because of anisotropic hyperfine field fluctuation. Temperature dependence of anisotropy energy is calculated from the relaxation rate.

Keywords: Mössbauer spectroscopy; Neutron diffraction; Anisotropy energy