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## Conference Book

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**Neutron studies of $La_{0.67}Ba_{0.33}Mn^{57}_{0.99}Fe_{0.01}O_3$**

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The perovskite $La_{0.67}Ba_{0.33}Mn^{57}_{0.99}Fe_{0.01}O_3$ compound has been studied with neutron diffraction, x-ray diffraction, Rutherford backscattering spectroscopy (RBS), Móssbauer spectroscopy, and magnetoresistance(MR) measurements. Neutron diffraction patterns of $La_{0.67}Ba_{0.33}Mn^{57}_{0.99}Fe_{0.01}O_3$ were taken at various temperatures ranging from 15 to 400 K.

The polycrystalline $La_{0.67}Ba_{0.33}Mn^{57}_{0.99}Fe_{0.01}O_3$ had a space group *Pnma* of orthorhombic perovskite structure with a lattice constants $a_0 = 5.526$ Å, $b_0 = 7.830$ Å, and $c_0 = 5.540$ Å, respectively. The maximum magnetoresistance ratio was observed at 281 K, with a magnitude of 9.5 % in 1 Tesla. From the móssbauer data, unusual phenomena provide direct evidence of the two-magneticphase character of the metallic state in the mixed valence of $La_{0.67}Ba_{0.33}Mn^{57}_{0.99}Fe_{0.01}O_3$ powder. The outer sextet of Móssbauer spectra rapidly collapsed to paramagnetic phase with increasing temperature. This result corresponds with the sudden change of magnetic peaks at same temperature region in neutron diffraction patterns referred above. It is interpreted that the relaxation rate increases with increasing temperature and finally leads to large MR effect.