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Program
Crystallographic and Mössbauer studies of YMn$_{1.8}$Fe$_{0.2}$O$_5$

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The crystallographic and magnetic properties of YMn$_{1.8}$Fe$_{0.2}$O$_5$ powders have been studied by x-ray, neutron diffraction, and Mössbauer spectroscopy. The samples were prepared by sol-gel process and crystallized at various temperatures. The crystalline structures of the powders sintered below 1200 °C were found to be a single phase of orthorhombic (space group : $Pbam$), containing in the crystalline structure infinite chains of Mn$^{4+}$–O$_6$ octahedra sharing edges, linked together by Mn$^{3+}$–O$_5$ bipyramid. But the samples sintered above 1200 °C were changed to hexagonal structure with satellite phases. The crystal structure is determined by rietveld method. For sintered at 1000 °C, the lattice parameters of YMn$_{1.8}$Fe$_{0.2}$O$_5$ were refined to be $a_0=7.294$, $b_0=8.492$, $c_0=5.681$ Å. The Mössbauer spectra of YMn$_{1.8}$Fe$_{0.2}$O$_5$ powders were taken at various temperatures ranging from 4.2 K to room temperature. The quadrupole splitting and the isomer shift at RT were 1.15 mm/s and 0.14 mm/s, respectively. The Neel temperature of YMn$_{1.8}$Fe$_{0.2}$O$_5$ was determined to be $T_N=40$ K.