

Neutron diffraction and dielectric anomalies in $\text{YMn}_{2-x}\text{Fe}_x\text{O}_5$

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The multiferroic $\text{YMn}_{2-x}\text{Fe}_x\text{O}_5$ ($x=0.00, 0.01, 0.02, 0.04$) system has been studied by neutron diffraction and Mössbauer spectroscopy, focusing on the dielectric constant anomaly near 18 K. We found that the electric Curie temperature (T_{CE}) decreased and the second transition anomaly temperature (T_2) smeared from the ϵ/ϵ_0 curves with higher Fe concentrations in $\text{YMn}_{2-x}\text{Fe}_x\text{O}_5$. The temperature dependence of the dielectric constant (ϵ/ϵ_0) shows a peak at 41 K and a second transition near 18 K for polycrystalline YMn_2O_5 . T_{CE} of $\text{YMn}_{1.96}\text{Fe}_{0.04}\text{O}_5$ was observed at 34 K. The temperature dependence of the lattice parameters for YMn_2O_5 shows a discontinuous jump at 18 K, which is the same anomaly temperature obtained from the dielectric constant curve. The Mössbauer electric quadrupole splitting value also changed at 21 K for $\text{YMn}_{1.99}\text{Fe}_{0.01}\text{O}_5$. Our data indicate that the changes in the lattice and Mössbauer parameters occur simultaneously with the anomaly of dielectric constant. © 2007 American Institute of Physics. [DOI: [10.1063/1.2711410](https://doi.org/10.1063/1.2711410)]