Crystal structure and magnetic microstructure of $\mathbf{Yb_{0.82}Sr_{0.18}Mn_{1-x}Fe_xO_3}$

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The structural and magnetic properties of $YbMnO_3$, $Yb_{0.82}Sr_{0.18}MnO_3$ and solid solutions $Yb_{0.82}Sr_{0.18}Mn_{1-x}Fe_xO_3$ (x = 0.1-0.2) are investigated by X-ray analysis, magnetic resonance, Mössbauer spectroscopy. Samples were prepared using standard ceramic processing. XRA of ferromanganites showed that all samples have the ilmenite ($FeTiO_3$) lattice. The lattice parameters are in good agreement with literature data. The Mössbauer spectra of ytterbium ferromanganites at room temperature have not magnetic hyperfine structure. Spectra are well described by a superposition of two quadrupole doublets with different quadrupole splitting relevant distorted octahedral and hexahedral environment of the Fe3+ cation [2]. Magnetic phase separation in the Mössbauer spectra observed at 80 K, when the spectrum is a superposition of doublet and sextet. Measurements of EPR spectra $Yb_{0.82}Sr_{0.18}Mn_{1-x}Fe_xO_3$ were carried out in X-band at temperatures from 100 to 320K. At low temperatures $Yb_{0.82}Sr_{0.18}Mn_{1-x}Fe_xO_3$ spectra consist of two lines with different temperature behavior, i.e. there is a magnetic two-phase state. When the temperature rises, the second line disappears and samples $Yb_{0.82}Sr_{0.18}Mn_{1-x}Fe_xO_3$ become a paramagnetic.