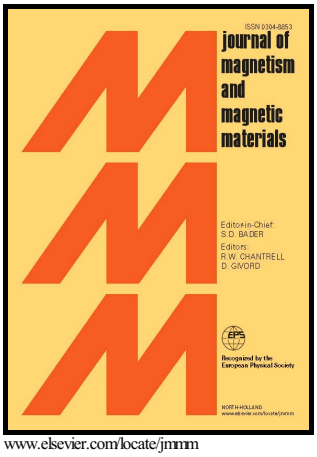

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Curie temperature enhancement with reserving a reasonable magnetoresistance by Pr substitution in Ba_2FeMoO_6

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Abstract

In the present work samples of $Ba_{2-x}Pr_xFeMoO_6$ double perovskites with x = 0 – 0.75 were synthesized at high temperature of 1523 K in the flowing of Ar+H_2 forming gas with H_2 concentration of 5 %. The results of X-ray powder diffraction and Rietveld analysis indicate that the crystal structure of $Ba_{2-x}Pr_xFeMoO_6$ is cubic with space group of $Fm\bar{3}m$. The Pr doping has reduced the lattice parameter and bond lengths of Pr/Ba-O and Fe/Mo-O which, have been estimated by Rietveld analysis (FULLPROF), consequently it enhances the ferrimagnetic transition temperature (T_C). On the other hand, it increases gradually the probability of antisite disorder which is the main reason for the decrease of the magnetization. Also, it produces more conducting channels in the samples causing enhancement of conductivity at low doping ratio for $x \leq 0.3$ but the effect is reversed at higher doping ratio for $x > 0.3$. The behavior of magnetoresistance (MR), with temperature shows intergrain magnetoresistance at low temperature which depends on the extrinsic properties, and intragrain magnetoresistance at room temperature which depends on intrinsic properties. Finally, it is worth mentioning that in the samples of x = 0.1, 0.2 and 0.75 a considerable Curie temperature enhancement has occurred with reserving a reasonable magnetoresistance which may be promising in different applications.

Keywords:

Double perovskites; Curie temperature; magnetic moment; DC resistivity; magnetoresistance.

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