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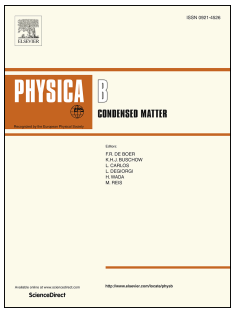

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Effects of Ga doping on the electric and magnetic properties of $DyMn_{1-x}Ga_xO_3$

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Abstract

Ga^{3+} for Mn^{3+} substitution in multiferroic $DyMn_{1-x}Ga_xO_3$(x=0, 0.02, 0.05, 0.1, 0.2, 0.3 and 0.4) has been performed to study the change on Mn^{3+} ordering, which also influences on the ordering of Dy^{3+}. The samples are pure and their dielectric constant, electric polarization and magnetic properties have been investigated. When the content of Ga^{3+} increases above 0.1, multiferroic properties completely disappear. These results indicate that Ga^{3+} for Mn^{3+} substitution in $DyMnO_3$ bulk can reduce the exchange interactions of $J_{Mn\text{-}Mn}$, $J_{Dy\text{-}Mn}$ and the bond angle of Mn-O-Mn, while the electric polarization is observed to decrease rapidly, even for small Ga doping, and the anomaly at low T in *P(T)* associated with the Dy ordering is no longer observed for x=0.05.

Key words: multiferroics; polycrystalline; Raman spectrum; electric polarization; specific heat; antiferromagnetic property