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Origin of multiferroicity in hexagonal $\mathbf{Y_{1-x}Dy_xMnO_3}$ A.K. SINGH, School of Physical Sciences, Jawaharlal Nehru University, New Delhi-110067 India, S.D. KAUSHIK, V. SIRUGURI, UGC-DAE-CSR Mumbai Centre, Bhabha Atomic Research Centre, Mumbai 400085, India , S. PATNAIK, School of Physical Sciences, Jawaharlal Nehru University, New Delhi-110067 India — Multiferroic materials, that offer the possibility of manipulating an ordered electric state by applying magnetic field, have attracted considerable attention in the recent past. Here we report a detailed analysis of structural, magnetic and dielectric properties of polycrystalline samples of $Y_{1-x}Dy_xMnO_3$ ($0 \leq x \leq 0.2$). These materials belong to space group $P6_3cm$ with hexagonal crystal structure and were synthesized by solid state reaction method. We have carried out extensive zero field and in-field neutron diffraction, and dielectric measurements. Our study provides evidence for change in the lattice parameters, buckling of Y (Dy) layers, Mn-O-Mn bond angles and tilting of MnO_5 pollyhedra as a function of temperature and magnetic field. We also study the magnetoelectric coupling in $YMnO_3$ as well as doped samples by in-field dielectric measurements. A distinct anomaly near Néel temperature is observed in these measurements that vary with the application of magnetic field. In essence, we develop a model to understand the magnetoelectric coupling of these antiferromagnetic multiferroics with their field dependent magnetic structure.

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