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Complex Magnetic Interactions in A-site and B-site Doped Multiferroic $TbMnO_3$ MARGO STARUCH, Department of Physics, University of Connecticut, MENKA JAIN, Department of Physics and Institute of Materials Science, University of Connecticut — Multiferroic materials have been of great interest in recent years due to a number of potential applications in random access memory or spintronics devices. $TbMnO_3$ in particular has attracted attention since the discovery of significant magnetoelectric coupling. The possibility of ferroelectricity in rare-earth chromites has also been examined recently through x-ray diffraction and dielectric measurements. Although several studies have looked at Cr-doped $LaMnO_3$, the nature of the Mn–Cr interactions is still controversial and no studies have been performed where the parent compound is multiferroic. In the present work, bulk $Tb_{1-x}A_xMnO_3$ (A = Ca^{2+} or Sr^{2+}) and $TbMn_{1-y}Cr_yO_3$ have been synthesized via solution route. The structural evolution as determined through x-ray diffraction and Raman spectroscopy is consistent with a reduction in the orthorhombic distortion. Magnetic properties distinct from the parent compound, including ferrimagnetism and ferromagnetism, have been observed due to the Mn^{3+}–Mn^{4+} or Mn^{3+}–Cr^{3+} interactions. These complex interactions between the Mn^{3+}/Mn^{4+}, Cr^{3+}, and Tb^{3+} moments will be discussed in detail.

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