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Frustrated antiferromagnetism in bulk Ti-doped $BiFeO_3$ ceramics
MIGUEL ANGEL GARCIA, MARA BERNARDO, TERESA JARDIEL, Dpt. Electroceramics, Institute of Ceramic and Glass, CSIC, Madrid, Spain, MARCO PEITEADO, Applied Physics Department, E.T.S.I. Telecomunicación, UPM, Madrid, Spain, FEDERICO MOMPEAN, MAR GARCIA-HERNANDEZ, Institute of Materials Science at Madrid, CSIC, Madrid, Spain, MARINA VILLEGAS, AMADOR CABALLERO, Dpt. Electroceramics, Institute of Ceramic and Glass, CSIC, Madrid, Spain — We present here a magnetic characterization of Ti-doped $BiFeO_3$ prepared by a ceramic route. A detailed analysis of the microstructure revealed that Ti^{+4} is not homogeneously distributed but partially segregated towards Ti enriched grain boundary regions that define Ti-deficient domains with a size distribution of the order of tens of nanometers. Since the size of these domains is smaller than the spin cycloid wavelength (64 nm) they hold a net magnetic moment. Consequently the material exhibits frustrated antiferromagnetism with hysteresis, coercivity and remanance. This ferromagnetic-like behavior vanishes at the Neel temperature of the $BiFeO_3$. The small magnetic moment per domain (M_S $\sim$0.2 emu/g) yields very large coercive fields of 27 KOe at 5 K and 17 KOe at room temperature.

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