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Structure transition and magnetic properties of high Cr-doped BiFeO₃ ceramic

Abstract:

Magnetic properties of BiFe_{1-x}Cr_xO₃ perovskite-type solids reaction synthesized at high pressure were investigated and a magnetic phase diagram was established. X-ray diffraction data revealed a crystal structure transformation from rhombohedral to monoclinic as Cr³⁺ ions substituted Fe ions in the samples. Néel temperature T_N and spin-reorientation temperature TSR were determined from dM/dT by easuring the temperature dependence of magnetization (M-T). The magnetization results indicated that T_N and TSR were strongly dependent on Cr³⁺ ion doping; both T_N and TSR decreased with the increase of Cr³⁺ doping. The magnetic hysteresis loops investigated at room temperature reflected an antiferromagnetic behavior from $x= 0.4$ to 0.6 and weak ferromagnetic at $x=1.0$. Besides, the remnant magnetization M_r and maximum magnetization M_{max} increased with increasing x from 0.4 up to 1.0. The Cr doping was found to be helpful in reducing coercivity H_c for the

magnetic samples from $x = 0.4$ to 0.8 and their applications as magnetic sensors are possible