Investigation of electrical and magnetic properties of single crystalline Mn doped $BiFeO_3$

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If ferromagnetic and ferroelectric are controlled by same driving force, Multiferroic materials, which exhibit dependence of spontaneous electric polarization and magnetization on the external electric and magnetic fields, may be useful in various type of device. $BiFeO_3$, leading multiferroic material is well known as ferroelectric (T_c=1083) and antiferromagnetism(T_N=634) at room temperature.

The multiferroic $(Bi_{0.9}Ba_{0.1})(Fe_{1-x}Mn_x)O_3$ (where x=0.1, 0.2, 0.3) has been synthesized by using the flux growth method. The crystal grown below the Curie temperature, consist of single ferroelectric domain. Effects of Mn substitutions on the structure and ferroelectric properties of $(Bi_{0.9}Ba_{0.1})(Fe_{1-x}Mn_x)O_3$ samples have been studied by performing neutron diffraction, ferroelectric measurement and magnetic measurements. Studies of ferroelectric properties (P) exhibit to reduce as a doped Mn molar ratio is increased. when we studied magntic structure by neutron diffractometor, a single-helicity spiral spin structure is disappeared and Fe spins exhibit the G-type antiferromagnetic order[1].

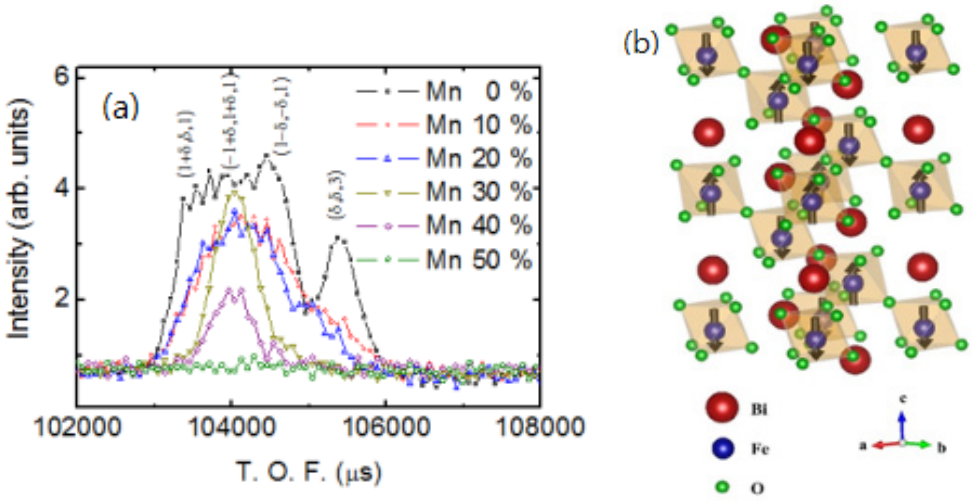

Fig. (a)Neutron diffraction patterns at the magnetic peak.
(b)Schemetic of BFO with G-type antiferromagnetic ordering.

Reference

[1] S Lee, T Choi, W Ratcliff, R Erwin, S. W. Cheong and V. Kiryukhin, *Phys. Rev. B* **78**, 100101, (2008).