Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Reduced metamagnetic transition fields in (Bi,Sm)FeO_3 single crystals YOON SEOK OH, B.-G. JEON, SEUNGHYUN KHIM, JAE WOOK KIM, KEE HOON KIM, Seoul National University, EUN SANG CHOI, NHMFL, D. KAN, I. TAKEUCHI, University of Maryland — For realizing useful magnetoelectric devices at room temperature, $BiFeO_3$ possesses several merits such as coexistence of ferroelectric and antiferromagnetic orders and large ferroelectric polarization. To increase the magnetoelectric coupling, it'll be also desirable to have a linear magnetoelectric effect, as originally anticipated in a hypothetical G-type antiferromagnetic ordering (3m) that can be realized in a $R3\bar{c}$ space group. Although the stabilization of a spiral spin ordering below 630 K, in reality, does not allow the linear magnetoelectric effect, it is known that the spiral spin structure can be broken under high magnetic fields to result in the linear magnetoelectric effect as well as weak ferromagnetism above 18 T. In this presentation, we report successful growth of high quality (Bi,Sm)FeO_3 single crystals by the flux method, and provide an electric/magnetic phase diagram up to high magnetic fields of 33 T. We find that the critical field for the weak ferromagnetic transition is reduced down to 6 T at room temperature, and anomalous magnetodielectric and magnetoelectric phenomena exist near the critical magnetic fields.

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Date submitted: 20 Nov 2009 Electronic form version 1.4