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Magnetic and electric control of multiferroic properties in monodomain crystals of $BiFeO_3$[1]

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One of the important goals for multiferroics is to develop the non-volatile magnetic memories that can be controlled by electric fields with low power consumption. Among numbers of multiferroic materials, $BiFeO_3$ has been the most extensively studied because of its substantial ferroelectric polarization and magnetic order up to above room temperature [1]. Recent high field experiments on monodomain crystals of $BiFeO_3$ revealed the existence of additional electric polarization normal to the three-fold rotational axis [2]. This transverse component is coupled with the cycloidal magnetic domain, and hence, can be controlled by external magnetic fields. Application of electric fields normal to the trigonal axis modifies volume fraction of these multiferroic domains, which involves change in resistance of the sample, namely exhibits the bipolar resistive memory effect [3]. In this talk, I will introduce the effects of magnetic and electric fields on magnetoelectric and structural properties observed in monodomain crystals of $BiFeO_3$. REFERENCES: [1] G. Catalan and J. F. Scott, Adv. Mater. 21, 2463 (2009). [2] M. Tokunaga *et al.*, Nature Commun. **6**, 5878 (2015). [3] S. Kawachi *et al.* Appl. Phys. Lett. **108**, 162903 (2016).

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