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Magnetoelectric Force Microscopy for visualizing cross-coupled domains[1] YANAN GENG, WEIDA WU, Department of Physics and Astronomy, Rutgers University, Piscataway, NJ 08854 — Intensive studies have been focused on magnetoelectric (ME) effect ever since Dzyaloshinskii and Astrov's seminal works on linear ME effect in Cr_2O_3. The measurements of the components of ME tensor are of great importance in technical applications and in fundamental science (e.g. determining magnetic point groups). For bulk ME measurements, it is necessary to obtain a single domain state by the ME annealing (i.e. applying magnetic and electric fields simultaneously) of the specimen through its transition temperature. However, the ME domain structure has never been directly observed due to the weakness of the ME effect in most magnetoelectrics. To address this critical issue, we have developed a nanoscale imaging technique, namely, the Magnetoelectric Force Microscopy (MeFM), to directly detect local ME response based on magnetic force microscopy with *in-situ* high voltages. Preliminary results of visualizing ME domains will be presented to demonstrate the feasibility of the MeFM technique.

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