Some Progress of Our Research in Complex Oxide

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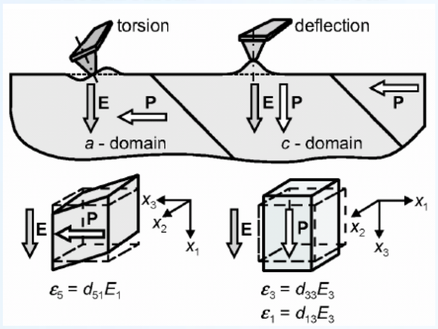
Abstract Complex oxide shows attractive characteristics which have simulated sharp increasing number of research. Ferroelectric materials, typical complex oxide which suffered deformation under external electric field was imaged with piezoresponce force microscopy(PFM). Magnetic state of ferromagnetic CoFeB was manipulated through the interface of CoFeB-PMNT(ferroelectric) heterojunction based on the magneto-electric coupling. LSMO, a colossal magnetoresistance material, was also fabricated, the magnetic and transport properties were investigated.

Ferroelectric domain imaging with PFM

Horizontal Vertical



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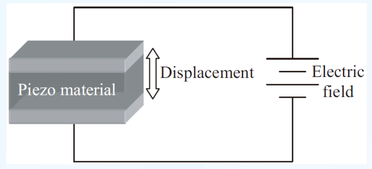
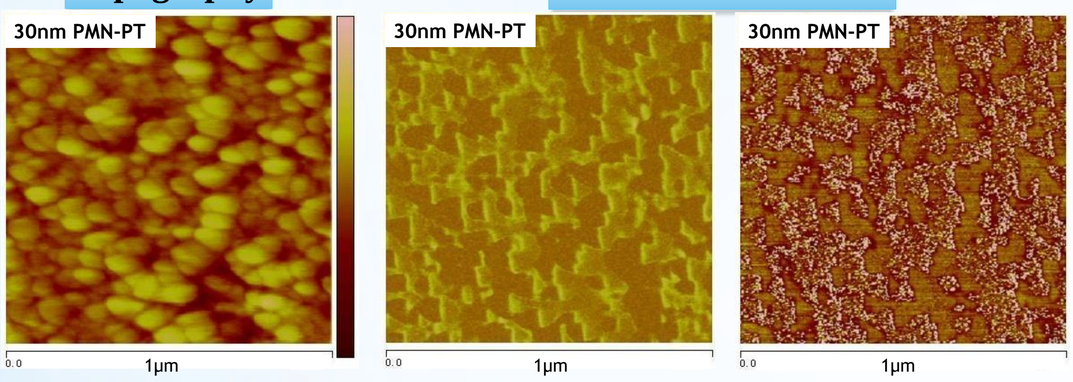
converse piezoelectric effect



Vibration of the probe

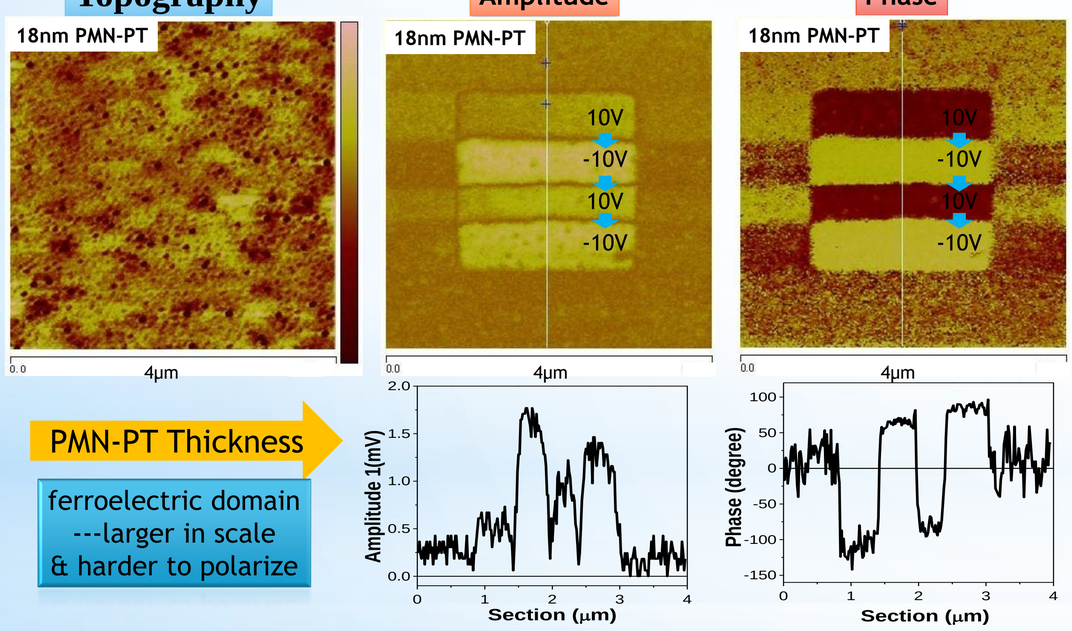
Amplitude Phase

Topography **Ferroelectric domain**



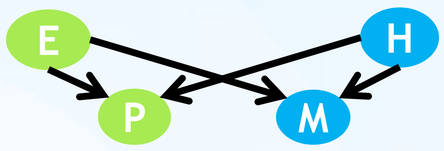
Polarized ferroelectric domain

Topography Amplitude Phase



Polarization in PMN-PT ferroelectric domain was imaged and switched by PFM

Magneto-electric coupling

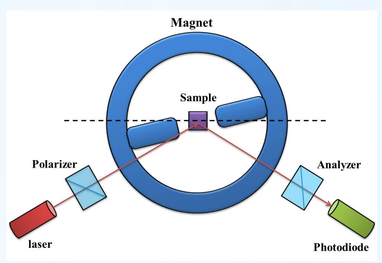


Electronic effect – interface bonding

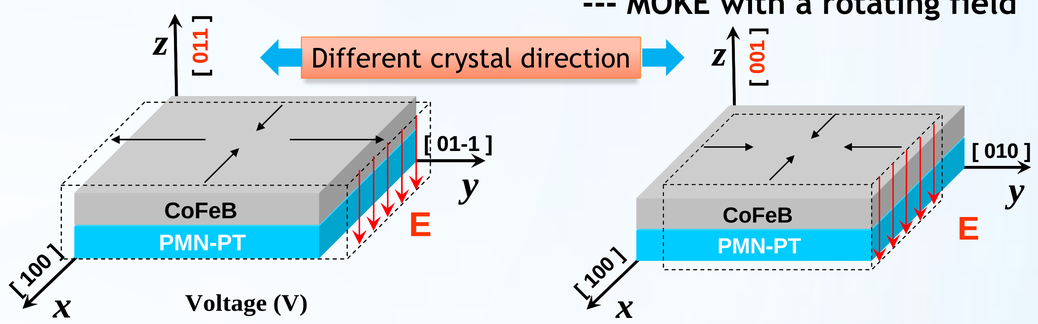
---- PRL 97, 047201 (2006)

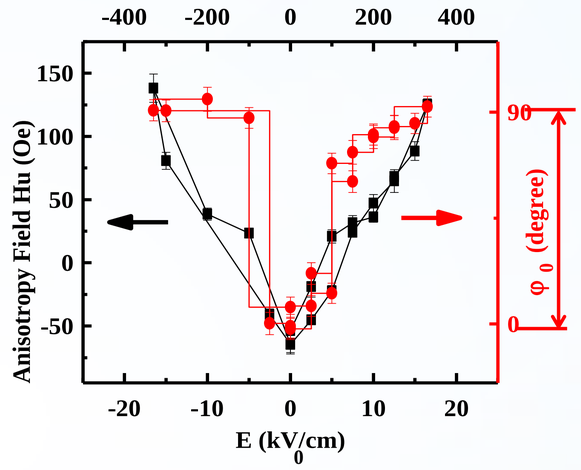
Strain caused by external field

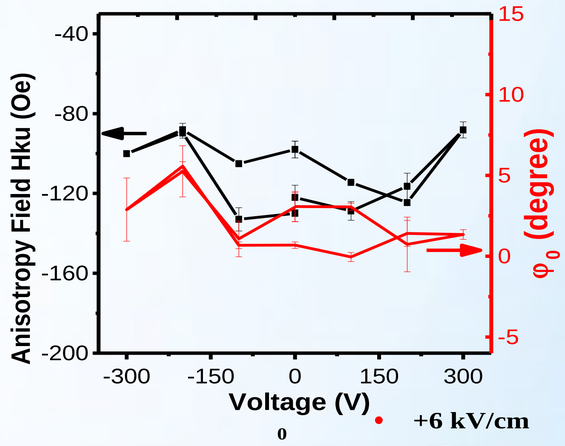
---- Nano Lett. 10, 1219 (2010)

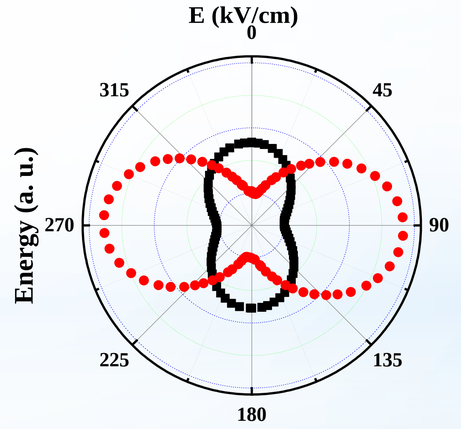


Magnetic anisotropy measurement
--- MOKE with a rotating field

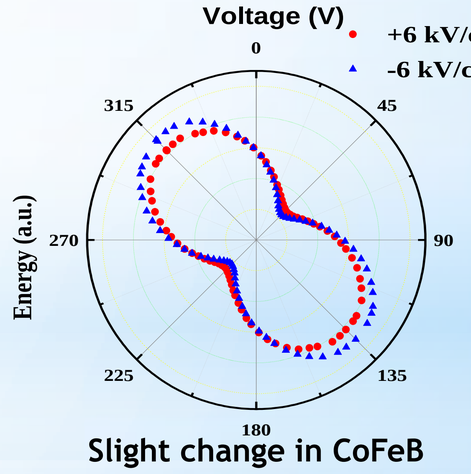








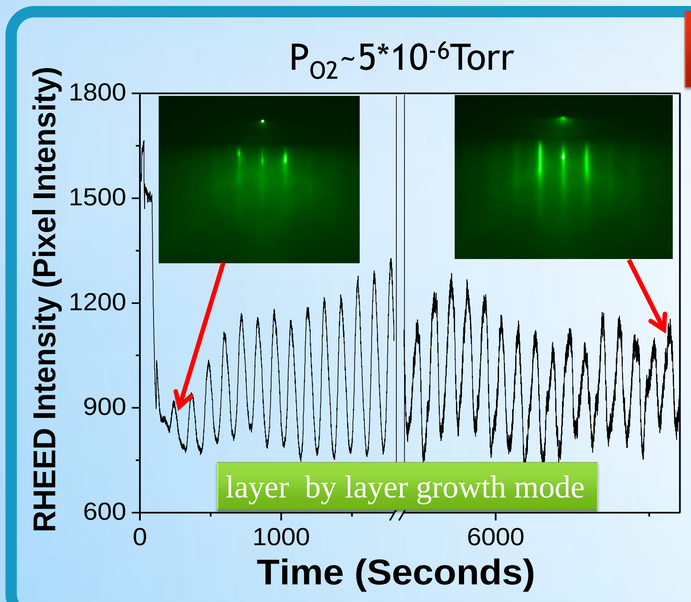
CoFeB easy axis: 90° rotation

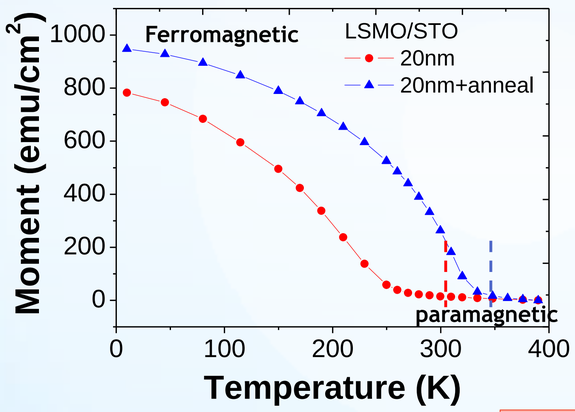


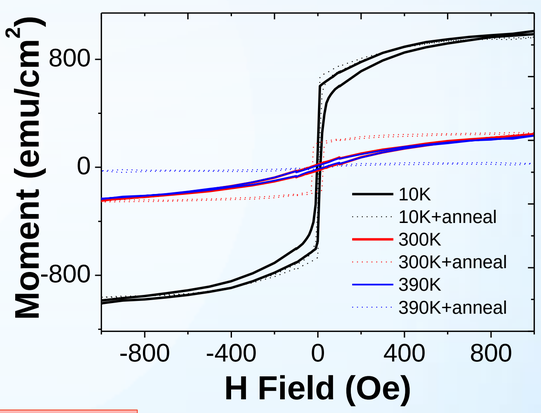
Slight change in CoFeB magnetic anisotropy

Magnetic anisotropy was manipulated by external electric field

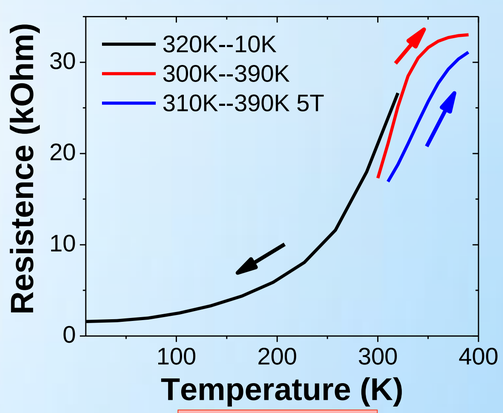
LSMO fabrication and magnetic, transport properties







Magnetism



Transport