Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Ferroelectric and multiferroic domain imaging by Laser-induced photoemission microscopy ANKE HOEFER, Institute of Physics, Martin Luther University Halle-Wittenberg, MICHAEL FECHNER, Max Planck Institute of Microstructure Physics Halle, KLAUS DUNCKER, INGRID MERTIG, WOLF WIDDRA, Institute of Physics, Martin Luther University Halle-Wittenberg — The ferroelectric as well as multiferroic surface domain structures of BaTiO3(001) and BiFeO3(001) are imaged based on photoemission electron microscopy (PEEM) by femtosecond laser threshold excitation under UHV conditions [1]. For well-prepared BaTiO3(001), three ferroelectric domain types are clearly discriminable due to work function differences. At room temperature, the surface domains resemble the known ferroelectric domain structure of the bulk. Upon heating above the Curie point of 400 K, the specific surface domain pattern remains up to 500 K [2]. Ab-initio calculations explain this observation by a remaining tetragonal distortion of the topmost unit cells stabilized by a surface relaxation. The (001) surface of the single-phase multiferroic BiFeO3 which is ferroelectric and antiferromagnetic, shows clear ferroelectric work function contrast in PEEM. Additionally, the multiferroic domains show significant linear dichroism. The observation of a varying dichroism for different ferroelectric domains can be explained based on the coupled ferroelectric-antiferromagnetic order in BiFeO3. It demonstrates multiferroic imaging of different domain types within a single, lab-based experiment. [1]Hoefer et al., IBM J. Res. Dev. 55, 4:1 (2011) [2]Hoefer et al., PRL 108, 087602 (2012)

Anke Hoefer
Institute of Physics, Martin Luther University Halle-Wittenberg

Date submitted: 09 Nov 2012 Electronic form version 1.4