Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Mapping Structural Phase Separation in $Eu_{0.5}Y_{0.5}MnO_3$ using 3D X-ray Microdiffraction[1] J.D. BUDAI, J.Z. TISCHLER, ORNL, W. LIU, ANL, D.D. SARMA, D. TOPWAL, Ind. Inst. Sci., G. SHENOY, W. YANG, ANL, B.C. LARSON, ORNL, S-W. CHEONG, Rutgers Univ., A.A. MUKHIN, Russ. Acad. Sci. — Phase coexistence in multicomponent manganite systems is known to occur over a wide range of length scales and strongly influences the magnetic and electronic properties. We have used 3D synchrotron x-ray Laue microdiffraction to investigate domain formation and local lattice structure in bulk $Eu_{0.5}Y_{0.5}MnO_3$ single-crystals. X-ray microdiffraction yields 3D spatially-resolved maps of the crystal structure, orientation and lattice parameter, while microfluorescence yields depth-integrated composition maps. The x-ray measurements reveal alternating lamella of orthorhombic Eu-rich and hexagonal Y-rich phases with a self-organized periodicity of ∼15 microns. Both phases maintain a well-defined long-range (∼mm) average crystal orientation with respect to the growth direction and to each other. However, small local variations in both orientation (i.e. mosaic) and lattice parameter (strain and composition) are observed, and the possible origins and implications of these inhomogeneities will be discussed.

[1]Support by DOE Office of Basic Energy Sciences, Division of Materials Sciences under contract with ORNL, managed by UT-Battelle; UNICAT/XOR and APS supported by DOE

John Budai
Oak Ridge National Lab

Date submitted: 03 Dec 2006 Electronic form version 1.4