Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

A New Synthesis Strategy For High-Quality Fe / $BaTiO_3$ Multiferroics X. CHEN, J. KIM, J.S. KIM, G. ROJAS, R. SKOMSKI, M. BODE, A. BHATTACHARYA, T. SANTOS, N. GUISINGER, A. GRUVERMAN, H. LU, A. ENDERS, UNIVERSITY OF NEBRASKA-LINCOLN TEAM, SOOK-MYUNG WOMEN'S UNIVERSITY COLLABORATION, ARGONNE NATIONAL LABORATORY COLLABORATION — Ultrathin film $BaTiO_3$/Nb-$SrTiO_3$ (BTO/STO) and Fe/BTO nanostructures were investigated with variable temperature scanning tunneling microscopy (STM) and low energy electron diffraction (LEED) under ultrahigh vacuum. BTO films of 8 – 13 unit cells thickness were grown by ozone-assisted molecular beam epitaxy on STO, and transferred through air into the STM chamber. Atomically flat, clean and unreconstructed films were recovered after annealing them in 1×10^{-4} mBar oxygen at 970K. Fe nanoclusters were deposited on the BTO by noble gas buffer layer assisted growth, and further studied by LEED and STM. The sharp 1x1 LEED images after cluster deposition show that the clusters are crystalline, suggesting that the interface oxidation is minimal. This synthesis route has thus the potential to fabricate ordered, atomically flat interfaces by suppressing interface mixing and Fe oxidation, which is a significant advantage over MBE deposition of Fe on BTO. The samples obtained are currently used as model system for the study of interface contributions to the magnetoelectric effect in multiferroics.

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Date submitted: 30 Nov 2009 Electronic form version 1.4