Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Reduction of a polar oxide surface in a strong DC-field[1] WOLFRAM STEURER, SVETLOZAR SURNEV, Institute of Physics, University of Graz, Universitaetsplatz 5, Graz, A-8010, Austria, GIOVANNI BARCARO, ALESSANDRO FORTUNELLI, IPCF/CNR, via G. Moruzzi 1, Pisa, I-56124, Italy, FALKO P. NETZER, Institute of Physics, University of Graz, Universitaetsplatz 5, Graz, A-8010, Austria — Polar oxide surfaces are of fundamental scientific interest because of their inherent instability in bulk samples on electrostatic grounds. Here we report first experimental evidence of field-induced reduction of a polar oxide surface by applying homogeneous external DC-fields. Ultrathin Ni-oxide nanostructures immersed into an Ag(100) substrate have been grown by reactive evaporation and have subsequently been exposed to electric fields in the range of 0.5-1.6 V/nm. We achieve such high fields in a setup resembling a plate capacitor where the Ag(100) substrate (with the deposited NiO film) acts as the cathode with a counter electrode placed 800nm apart. For fields exceeding the threshold of 0.9 V/nm, oxygen atoms are torn away from the surface, thus, efficiently reducing the initially highly-ordered Ni-oxide film. The remaining Ni atoms on the surface are highly mobile and cluster together. No oxide reduction occurs if the field polarity is inverted.

[1]This work is supported by the ERC Advanced Grant "SEPON."

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Date submitted: 23 Dec 2010 Electronic form version 1.4