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The Structure of High Polarization Surface of the Antiferromagnet Cr_2O_3 NING WU, XIN ZHANG, KEISUKE FUKUTANI, XI HE, CHRISTIAN BINEK, PETER DOWBEN, Department of Physics and Astronomy and the Nebraska Center for Materials and Nanoscience, University of Nebraska-Lincoln, Lincoln, NE 68588, USA, WAI-NING MEI, Department of Physics, University of Nebraska at Omaha, Omaha, NE 68182-0266, USA, ZHAOXIAN YU, School of Physics and Engineering, Zhongshan University, Guangzhou 510275, Peoples Republic of China, UNL TEAM, UNO COLLABORATION, ZHONGSHAN COLLABORATION — Manipulation of magnetically ordered states by electrical means is among the most promising approaches towards novel spintronic devices. Electric control of the exchange bias can be realized when the passive antiferromagnetic pinning layer is replaced by a magneto-electric antiferromagnet, like the prototypical magnetoelectric $Cr_2O_3(0001)$, so long as there is also a finite remanent magnetization at the surface or boundary. We have demonstrated that a very unusual high polarization surface magnetic order exists at the surface of the Cr2O3 (0001) surface and is robust against surface roughness from spin polarized inverse photoemission, and X-ray magnetic circular dichroism. We have also performed LEED (low energy electron diffraction) I(V) analysis to explore the surface structure above and below Neel Temperature (308 K). Temperature dependent LEED was also carried out at several different electron kinetic energies and Debye temperature was extracted. The surface and bulk Debye temperatures were obtained by fitting Debye temperature as a function of electron kinetic energy.

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