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Atomic resolution spectroscopic imaging of electronic phenomena in oxide interfaces M. VARELA, H. M. CHRISTEN, H. N. LEE, D. H. KIM, L. PETIT, T. C. SCHULTHESS, J. TAO, A. R. LUPINI, S. J. PENNYCOOK, Oak Ridge National Laboratory, W. LUO, S. T. PANTELIDES, Vanderbilt University, J. GARCIA-BARRIOCANAL, C. LEON, J. SANTAMARIA, Universidad Complutense, Spain — Electron energy loss spectroscopy in the STEM is a powerful tool to study the structure, chemistry and electronic properties of oxides with atomic resolution, in real space. In perovskites the O 2p bands and the transition metal 3d bands are very close to the Fermi level so the electronic properties can be probed by studying the fine structure on the O K edge and the transition metal L edge. Column-by-column EELS reveals direct information about the unique phenomena going on in oxide interfaces. For example, in superconducting/ferromagnetic $YBa_2Cu_3O_7$/ $La_{0.3}Ca_{0.7}MnO_3$ superlattices significant transfer of electrons from the manganite into the superconductor is found over nanometric length scales. But quite different phenomena occur in other manganite interfaces such as $LaMnO_3/SrTiO_3$. In this talk both experiments and first principles calculations with simulations of the ELNES will be discussed. Sponsored by the Office of Basic Energy Sciences, Div of Materials Sciences and Engineering, US DOE under contract DE-AC05-00OR22725 with ORNL managed by UT-Battelle LLC, by the ORNL LDRD Program and by the ORNL-ORISE Postdoctoral Program.

Maria Varela
Oak Ridge National Laboratory

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