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What EELS Spectra Tell Us About Manganite/ferroelectric Interfaces: Ab Initio Results ALEXANDRU BOGDAN GEORGESCU, Department of Physics and Center for Research on Interface Structures and Phenomena, Yale University, M.S.J. MARSHALL, Department of Applied Physics and Center for Research on Interface Structures and Phenomena, Yale University, A. GULEC, P.J. PHILIPS, R.F. KLIE, Department of Physics, University of Illinois at Chicago, F.J. WALKER, Department of Applied Physics and Center for Research on Interface Structures and Phenomena, Yale University, C.H. AHN, SOHRAB ISMAIL-BEIGI, Department of Physics and Center for Research on Interface Structures and Phenomena, Yale University — The interplay of structure, electronic states, and magnetism is a rich field of research for transition metal oxides. Manganese oxides are well known for the dependence of their magnetic state and resistivity on doping (colossal magnetoresistance) which can be modified by chemical alloying or dynamically via the ferroelectric field effect. We focus on the interface between an oxide ferroelectric and the manganite $La_xSr_{1-x}MnO_3$ where it has already been established that there is a dramatic coupling of atomic geometry, electronic structure and magnetism which leads to a very large magnetoelectric coupling. In this work, we use first principles theory to understand what observed atomically-resolved EELS spectra on such systems tell us about the interfacial structure and electronic properties. By understanding the link between EELS and atomic-scale structure at an oxide interface, one can then more confidently interpret experimental results to understand interfaces of novel materials, particularly correlated electron systems.

Alexandru Bogdan Georgescu
Yale University

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