Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Tuning the conductivity of $LaMnO_3/SrTiO_3$ superlattices by stacking[1] YANPENG YAO, KARIN RABE, Rutgers, the State University of New Jersey, DEPARTMENT OF PHYSICS AND ASTRONOMY TEAM — First-principles density-functional-theory calculations have been applied to study the structure and electronic properties of ultrathin $LaMnO_3/SrTiO_3$ superlattices. We predict that upon the change of stacking, antiferromagnetic $LaMnO_3/SrTiO_3$ superlattices can be tuned from non-conducting insulator to conducting metal. The corresponding microscopic structure change in the superlattices is also analyzed. We find that the metal-insulator transition is accompanied by a corresponding reduction/disappearance of the Jahn-Teller (JT) distortion in the $LaMnO_3$ layer. The findings of this work illustrate the role of the JT distortion in the conductivity of transition-metal perovskites, and also suggest a new method for tuning metal-insulator transitions for functional device design.

[1]This research is supported by the Office of Naval Researc.h

Yanpeng Yao
Rutgers, the State University of New Jersey

Date submitted: 19 Nov 2012 Electronic form version 1.4