Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Hole doping in VO_2 thin films SALINPORN KITTIWATANAKUL, Department of Materials Science and Engineering, University of Virginia, Charlottesville, VA, RYAN COMES, Fundamental and Computational Sciences Directorate, Pacific Northwest National Laboratory, Richland, WA, YUHAN WANG, Department of Materials Science and Engineering, University of Virginia, Charlottesville, VA, STUART WOLF, Department of Physics and Department of Materials Science and Engineering, University of Virginia, Charlottesville, VA, JIWEI LU, Department of Materials Science and Engineering, University of Virginia, Charlottesville, VA — Chemical doping has been used to modulate the metal-semiconductor transition in VO_2 extensively. Here, we investigated the effect of aliovalent Al^{3+} doping in VO_2 thin films on the Metal-Semiconductor Transition (MST) in comparison with the effect of isovalent Mn^{4+} doping. Raman spectroscopy and x-ray diffractometry were used to confirm the monoclinic phase and estimate the lattice strain caused by the doping. The concentration and the valence state of the dopants observed by XPS will be discussed. The Al^{3+} ions are expected to introduce holes into the conduction band of the VO_2, and the evidence for hole doping by Al^{3+} was observed by Hall effect measurements. This effect has not been reported previously. Both types of dopants were found to increase the change of the resistivity across the MST, and they also shifted the T_{MST}.

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Date submitted: 14 Nov 2014 Electronic form version 1.4