Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Broadband Infrared Spectroscopy of Vanadium Dioxide Films Under the Influence of Strain[1] T.J. HUFFMAN, PENG XU, A.J. HOLLINGSHAD, N.E. PENTHORN, D.J. BROOKER, M.M. QAZILBASH, LEI WANG, R.A. LUKASZEW, Department of Physics, College of William and Mary, R.D. PIKE, Department of Chemistry, College of William and Mary, B.-J. KIM, H.-T. KIM, Center of Metal-Insulator Transition, ETRI — Vanadium dioxide (VO_2) undergoes a phase transition between an insulating monoclinic phase and a conducting rutile phase. Even in this simple, stoichiometric material, a complete explanation of the phase transition has proved elusive. This transition, like phase transitions in other correlated electron systems, involves interacting electronic, lattice, and orbital degrees of freedom. This leads to physical properties that are particularly sensitive to small changes in external parameters such as strain. VO_2 films grown on different substrates are subject to differing strain effects that often lead to a shift in the transition temperature. Broadband infrared (IR) and optical spectroscopy allows us to examine the electronic structure and dynamics as well as IR-active, zone-center phonons of strained films grown on sapphire and quartz. Comparing and contrasting the IR and optical properties of these films, and those of bulk crystals, will provide insight into the influence of strain on the electronic and lattice degrees of freedom.

[1]MMQ gratefully acknowledges support from the Jeffress Memorial Trust

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Date submitted: 09 Nov 2012 Electronic form version 1.4