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**Correlation between metal-insulator transition characteristics and electronic structure changes in vanadium oxide thin films** D. RUZMETOV, V. NARAYANAMURTI, S. RAMANATHAN, SEAS, Harvard University, Cambridge, MA, S.D. SENANAYAKE, CSD, Oak Ridge National Lab, Oak Ridge, TN — We correlate electron transport data with energy band structure measurements in vanadium oxide thin films with varying V-O stoichiometry across the VO<sub>2</sub> metal-insulator transition (MIT). A set of vanadium oxide thin films were prepared by reactive DC sputtering from a V target at various oxygen partial pressures resulting in films with different MIT strength as determined from the electrical resistance measurements. The results of the near edge X-ray absorption fine structure spectroscopy (NEXAFS) of the O K-edge in identical VO films are presented. Redistribution of the spectral weight from  $\sigma^*$  to  $\pi^*$  bands is found in the vanadium oxide films exhibiting stronger VO<sub>2</sub> MIT. This is taken as evidence of the strengthening of the metal-metal ion interaction with respect to the metal-ligand and indirect V-O-V interaction in vanadium oxide films featuring sharp MIT. We observe also a clear correlation between MIT and the width and the area of the lower  $\pi^*$  band which is likely to be due to the emergence of the  $d_{||}$  band overlapping with  $\pi^*$ . The strengthening of this  $d_{||}$  band near the Fermi level only in the vanadium oxide compounds displaying the MIT points out the importance of the role of the  $d_{||}$  band and electron correlations in the phase transition.

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