

Abstract Submitted
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A study on the metal-insulator transition in $V_{1-x}W_xO_2$ by optical spectroscopy BYUNG GYU CHAE, HYUN TAK KIM, ETRI, MUMTAZ M. QAZILBASH, DIMITRI N. BASOV, UCSD — A strong Coulomb repulsion between electrons in a system with half filling makes a Mott insulator, although the band theory predicts that the system should be metallic. Carrier doping of a Mott insulator leads to an anomalous change in the electronic structure such as the transfer of spectral weight. VO_2 having a $3d^1$ electron configuration has attracted considerable attention for its classification into a Mott system or a Peierls band insulator because of the metal-insulator transition accompanying structural change. We investigated the metal-insulator transition in thin films of tungsten-doped vanadium oxide: $V_{1-x}W_xO_2$, focusing on the lightly doped regime. Optical gap excitation at 2.5 eV for a film of $x = 0.012$ is substantially suppressed, which coincides with the appearance of electronic spectral weight in the mid-infrared region. In films with $x=0.04$ we observed a strong Drude spectrum indicative of the metallic state. Our results are difficult to reconcile with the dominant role of the Peierls picture in the metal to insulator transition.

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