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Surface vs. Bulk Characterizations in Electronic Inhomogeneity of a VO2 thin film. YOUNG JUN CHANG, J.S. YANG, T.W. NOH, ReCOE & FPRD, Department of Physics & Astronomy, Seoul National University, Seoul, Korea., D.-W. KIM, Department of Applied Physics, Hanyang University, Ansan, Kyeonggi 426-791, Korea., J.-S. CHUNG, Department of Physics and CAMDRC, Soongsil University, Seoul 156-743, Korea., E. OH, B. KAHNG, School of Physics and Center for Theoretical Physics, Seoul National University, Seoul 151-747, Korea.
— We have examined the validity of the percolation model for a VO2 thin film using both surface- and bulk-sensitive measurement during the metal-insulator transition (MIT). VO2 is one of the most widely investigated strongly correlated transition metal oxides, and it displays the MIT at around 340K. The metallic surface area fraction obtained by scanning tunneling spectroscopy fails to reproduce conductivity change, whereas the metallic volume fraction extracted by bulk-sensitive techniques confirms the percolative nature of the transport data. This discrepancy suggests that the surface-sensitive techniques require special care in investigating the electronic structures of strongly correlated transition metal oxides which have strong electron-phonon coupling.

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