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Optical and microscopic studies on metal-insulator transition of the VO₂ thin film C. H. KOO, J. S. LEE, Y. J. CHANG, T. W. NOH, ReCOE and School of Physics, Seoul National University, Seoul, 151-747, Korea, B. G. CHAE, H.-T. KIM, Basic Research Laboratory, Electronics and Telecommunications Research Institute, Daejeon, 305-350, Korea — We investigated the temperature dependent optical spectra of VO₂, which exhibits an abrupt metal-insulator transition (MIT) around 340 K, in the wide energy range of 0.5-5.0 eV. We observed four absorption peaks around 1 eV, 2 eV, 3 eV, and 4 eV in the insulating state and a large spectral weight redistribution among them as the MIT occurs. We argue that the peaks could be assigned based on the orbitally degenerate Hubbard model suggesting the importance of the electron correlation in VO₂. And we understand the spectral changes occurring with the MIT in terms of the variation of orbital states induced by the structure distortions. Based on our optical analysis, we will address which plays a dominant role in the MIT between electron correlation and electron–lattice interaction. Additionally, we will present the scanning tunneling spectroscopy results confirming that the MIT of VO₂ occurs in a percolation process, which is proposed by a previous optical study [1]. [1] H. S. Choi *et al.*, Phys. Rev. B **54**, 4621 (1996).

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