Charge dynamics in thermally and doping induced insulator-metal transitions of \((\text{Ti}_{1-x}\text{V}_x)\text{O}_3\) MASAKI UCHIDA, JUN FUJIOKA, YOSHINORI ONOSE\(^1\), YOSHINORI TOKURA\(^2\), Department of Applied Physics, University of Tokyo — Charge dynamics of \((\text{Ti}_{1-x}\text{V}_x)\text{O}_3\) with \(x = 0 - 0.06\) has been investigated by measurements of charge transport and optical conductivity spectra in a wide temperature range of 2 - 600 K with the focus on the thermally and doping induced insulator-metal transitions (IMTs). The optical conductivity peaks for the interband transitions in the 3d \(t_{2g}\) manifold are observed in the both insulating and metallic states, while their large variation (by \(\sim 0.4\) eV) with change of temperature and doping level scales with that of the Ti-Ti dimer bond length, indicating the weakened singlet bond in the course of IMTs. The thermally and V-doping induced IMTs are driven with the increase in carrier density by band-crossing and hole-doping, respectively, in contrast to the canonical IMT of correlated oxides accompanied by the whole collapse of the Mott gap.

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