Temperature Dependent of the Optical Spectral Weight in Correlated Metal \(\text{Nd}_{1-x}\text{TiO}_3(x=0.095)\) JING YANG, JUNGSEEK HWANG, THOMAS TIMUSK, Department of Physics and Astronomy, McMaster University, ATHENA SAFAT-SEFAT, JOHN E. GREEDAN, Department of Chemistry, McMaster University — We investigated the infrared reflectance of \(\text{Nd}_{1-x}\text{TiO}_3\), which is a hole-doped transition-metal-oxide system. In the metallic sample with \(x=0.095\) (hole concentration\(=3x=0.285\)), the partial optical spectral weight, 

\[
\omega(\Omega, T) = \int_0^\Omega \sigma_1(\omega, T)d\omega,
\]

turns out to be a linear function of \(T^2\) at different cutoff frequencies. Recent optical studies of LSCO [1] and BSCCO [2] also found that the optical spectral weight varies quadratically with temperature, i.e. 

\[
\omega(\Omega, T) \simeq \omega_0 - B(\Omega)T^2,
\]

in both superconductors and nonsuperconducting metals. The coefficient \(B(\Omega)\) was considered as a “thermal response” of the carriers. In our study, for \(\text{Nd}_{1-x}\text{TiO}_3(x=0.095)\), \(B(\Omega)\) exhibits distinct features which we compare to both cuprates and conventional metals. [1] M. Ortolani et al., Phys. Rev. Lett. 94, 067002 (2005). [2] H. J. A. Molegraaf et al., Science 295, 2239 (2002).