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Electron-phonon coupling in $SrTi_{1-x}Nb_xO_3$[1] D. VAN MECHELEN, P. ARMITAGE, Universite de Geneve, C. GRIMALDI, EPFL, A. KUZMENKO, J. TEYSSIER, D. VAN DER MAREL, Universite de Geneve — One of the major questions in the physics of high temperature is, to what extent electron-phonon coupling is important for the transport anomalies and for the superconductivity itself. One of the difficulties in addressing this issue for the cuprates, is the complexity of these materials, which are doped Mott-insulators, anti-ferromagnetic, striped, etcetera. In order to separate out the electron-phonon coupling we have studied the perovskite $SrTi_{1-x}Nb_xO_3$ with $0.0002 < x < 0.02$. The lowest unoccupied bands of pristine $SrTiO_3$are Ti 3d bands of t_{2g} character, which become occupied with electrons upon substituting Nb for Ti. Here we report THz, infrared and optical spectra, DC resistivity and Hall effect. The infrared spectra at 7 K reveal a very narrow (less than 2 meV) Drude peak, the spectral weight of which reveals a strong mass-enhancement ($m^*/m \sim 10$) at the lowest carrier concentration, which diminishes gradually to $m^*/m \sim 2$ as we increase the carrier concentration. The mass enhancement, the doping dependence thereof, and several other features in the infrared spectra, indicate that electron-phonon coupling is strong. The trend as a function of doping furthermore suggests the evolution from a phonon-renormalized Fermi-liquid toward a gas of small polarons in the limit of $x \rightarrow 0$.

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Dirk van der Marel
Universite de Geneve

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