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Raman Study of Phonon Softening in Individual Metallic Single Wall Nanotubes HOOTAN FARHAT, HYUNGBIN SON, JING KONG, MIT — We have studied the Breit-Wigner-Fano (BWF) lineshape and frequency of the G^- Raman mode in individual metallic nanotubes as function of the Fermi level position. Single wall carbon nanotubes are grown from dispersed nanoparticles and are doped electrostatically by means of a polymer electrolyte gate. The frequency of the G^- phonon in metallic tubes is very sensitive to the position of the Fermi level. As the Fermi level is tuned below and above the Fermi point, a semiconducting like G-band is recovered both in terms of frequency and linewidth. Near the Fermi point, the downshift of the G^- frequency with respect to that of semiconducting tubes reaches a maximum of up to $50cm^{-1}$. The doping and diameter dependence of the phonon softening are explained in terms of electron phonon coupling.

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