The Effects of Substrate Phonon Mode Scattering on Transport in Carbon Nanotubes

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Supporting Information

Here we report calculations of the low-field mobility temperature dependence and diameter dependence at room temperature in the presence of the CNT phonon scattering only. The mobility shows a single maximum as a function of density for the Fermi level below the bottom of the second band [1]. The temperature dependence of the peak mobility in (19,0) tube is shown in Fig. 1 and the corresponding density where the peak occurs in Fig 2. The diameter dependence of the peak mobility at room temperature is shown in Fig. 3 and the corresponding diameter dependence of the carrier density where the peak occurs are shown in Fig. 4.

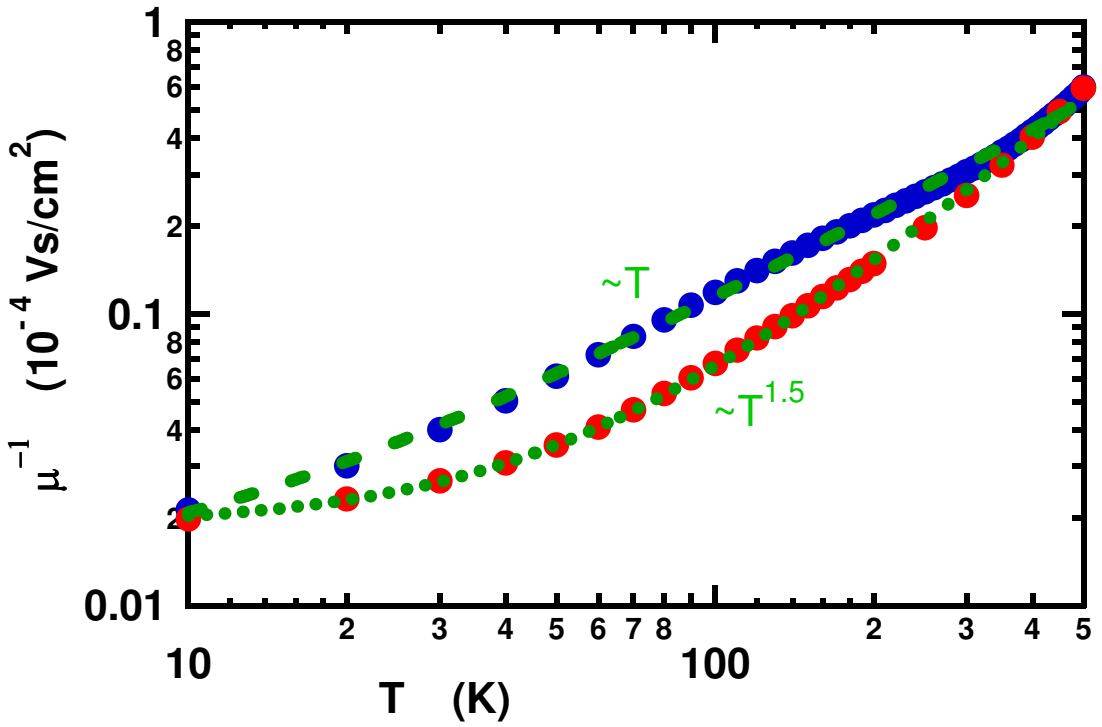

Fig. 1. Low-field inverse mobility as a function of temperature in (19, 0) tube at low density (blue circles) and the peak mobility at finite density (red circles). The dashed line

is a linear fit $\mu^{-1}=0.01+0.001\ T$ to the low density limit inverse mobility and dotted curve is a power low fit $\mu^{-1}=0.019+0.00048\ T^{1.5}$ to the maximum mobility at finite density.

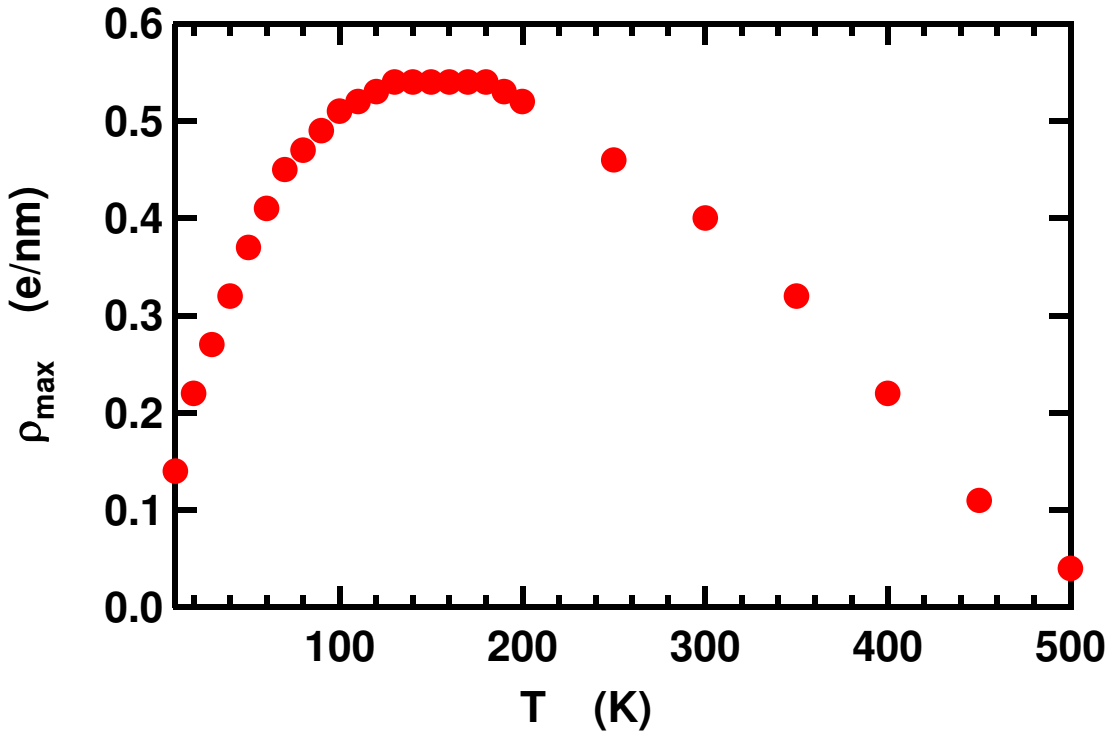

Fig. 2. Temperature dependence of the density at which low-field mobility is maximum in (19, 0) tube.

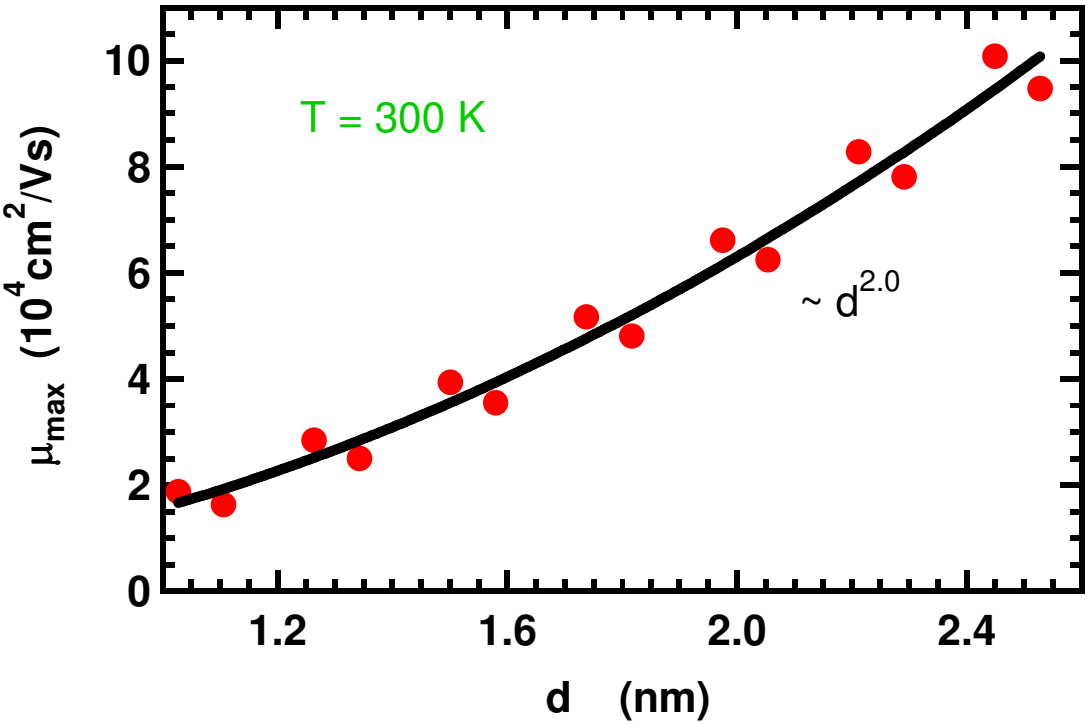

Fig. 3. Diameter dependence of the peak mobility in zig-zag tubes at room temperature. The black solid curve is a fit $\mu_{max}=1.6\ d^2$.

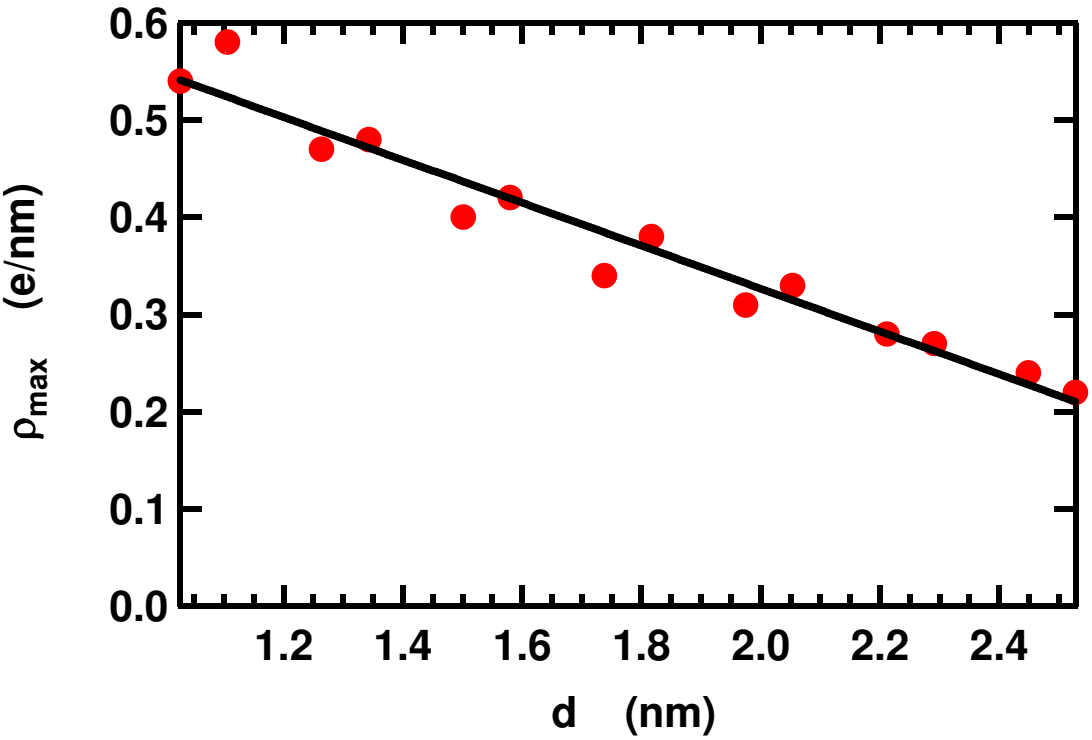

Fig. 4. Diameter dependence of the density at which mobility is maximum in zig-zag tubes at room temperature. The black solid curve is a linear fit $\rho_{max}=0.77\ -0.22d$.

References

[1] Perebeinos, V.; Tersoff, J.; Avouris, Ph. *Nano Lett.* **2006**, *6*, 205.