

Abstract Submitted
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Graphene and Graphite Nanoribbons: phonon-scattering limit of conductivity from tight-binding¹ DANIEL FINKENSTADT, U.S. Naval Research Laboratory, GARY PENNINGTON, U.S. Army Research Laboratory, MICHAEL MEHL, U.S. Naval Research Laboratory — To understand nanoribbons of graphene, and multilayers of such ribbons, we developed an ab initio parametrized fit to Carbon and Hydrogen chemical data, out to arbitrary neighbor interactions, including relaxations [*Phys. Rev. B* **76**, 121405R (2007)]. Our computed band structure shows a decrease in the armchair edge band gap when ribbons are multilayered. Further, the well-known three-family behavior of armchair bandgaps is confirmed and shown here to apply also to the drift velocity of charge carriers, which can have $\pm 20\%$ deviation from the ideal Fermi velocity. Boltzmann carrier transport simulations from calculated phonon spectra also show a familial dependence of conductance, peak field-effect mobility and “on” conductance that increase linearly with ribbon width. We will also discuss phonon-limited scattering of charge carriers in graphene multilayers and the temperature dependence of transport.

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