

TRANSPORT PROPERTIES OF GRAPHENE IN THE HIGH-CURRENT LIMIT

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We present a detailed study of the high-current transport properties of graphene devices patterned in a four-point configuration [1]. The current tends to saturate as the voltage across graphene is increased but never reaches the complete saturation as in metallic nanotubes. The current in the saturation regime can be modulated by sweeping the backgate voltage. Measurements are compared to a model based on the Boltzmann equation, which includes electron scattering processes due to charged and neutral impurities, and graphene optical-phonons. The current saturation arises from the balance between elastic and optical-phonon scattering. Our work shows that the saturation current can be significantly increased by reducing disorder. This result holds promise for high-speed graphene electronics.

References:

[1] A. Barreiro, M. Lazzeri, J. Moser, F. Mauri, A. Bachtold, submitted to Phys. Rev. Lett.

Figures:

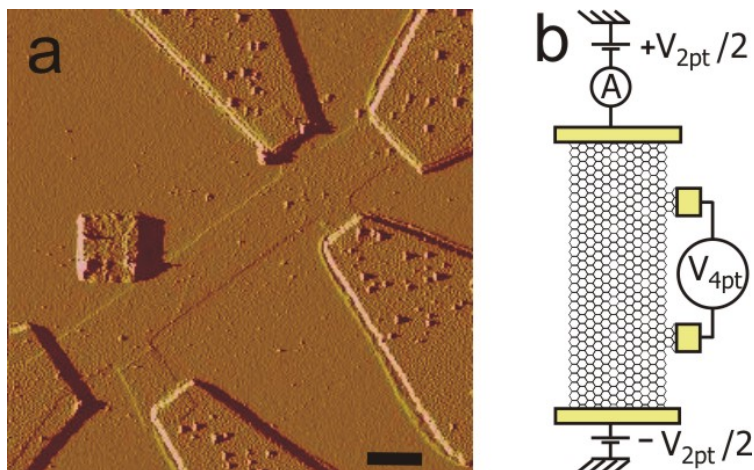


Fig. 1. Experimental setup. (a) Atomic force microscopy image of a graphene device. The scale bar is 1 μm. (b) Schematic of the set-up for the four-point measurement. The device is symmetrically voltage biased.