Large Scale Mesoscopic Transport in Nanostructured Graphene*,†

Ping Sheng¹,²

¹ Department of Physics and William Mong Institute of Nano Science and Technology, HKUST, Clear Water Bay, Kowloon, Hong Kong, China.
² Institute for Advanced Study, Hong Kong University of Science and Technology, Clear Water Bay, Kowloon, Hong Kong, China.

sheng@ust.hk

Through exponential sample-size scaling of conductance, we demonstrate strong electron localization in three sets of nanostructured antidot graphene samples with localization lengths of 1.1, 2, and 3.4 μm. The large-scale mesoscopic transport exists as a parallel conduction channel to 2D variable range hopping, with a Coulomb quasigap around the Fermi level. The opening of the correlation quasigap, observable below 25 K through the temperature dependence of conductance, makes possible the exponential suppression of inelastic scatterings and thereby leads to an observed dephasing length of 10 μm.

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