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Exploring Transport Effects in Nanoscale Graphene Devices JEFF WORNE, CHARUDATTA GALANDE, HEMTEJ GULLAPALLI, PULICKEL AJAYAN, DOUGLAS NATELSON, Rice University — Graphene, the single- to few-atomic layers cousin to graphite, has become a very interesting topic of research owing to its unique mechanical, optical, thermal and electrical properties. Many of the properties of graphene can be traced to its structural uniformity, allowing both electrons and holes to travel long distances (up to several microns) before scattering. However, studying graphene on the micron level can mask its true nanoscale behavior. Using very short length scales allows for the investigation of the behavior of charge impurities, contact effects and ballistic transport. In this work, we fabricate sub-30 nanometer suspended graphene 3-terminal devices on gold and platinum electrodes. We present data from electrical measurements on charge impurities that are apparent at this length scale and the effect of electrode work function on contact resistance. We compare this to mechanically exfoliated graphene on a silicon/SiO2 substrate with gold electrodes.

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