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Transport Properties of Fluorinated Graphene S.-H. CHENG, X. HONG, J. ZHU, Department of Physics, Penn State University — We attach fluorine atoms to single-layer graphene sheets through sp^3 bonding and study the effect of fluorination on electrical transport. This chemical modification occurs in fluorine-containing gas through the assistance of plasma. Raman spectra of fluorinated graphene show the appearance of the D band, whose intensity varies with plasma settings. In lightly fluorinated graphene, the D band completely disappears after the sample is thermally reduced in forming gas. This observation suggests that fluorine atoms can be attached and removed from the graphene plane reversibly without creating vacancies. On the other hand, in heavily fluorinated samples, the reduction process no longer restores pristine graphene, suggesting damage to the sp^2 carbon network. The temperature-dependent resistivity of fluorinated graphene exhibits insulating behavior, which can be described by variable range hopping in 2D at low carrier densities but deviates from this model at high carrier densities. We discuss the origin of these results.

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