

Abstract Submitted
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Graphene Transport Under the Influence of Polar Molecules¹

BARRETT WORLEY, SEOHEE KIM, SAUNGEUN PARK, Univ of Texas, Austin, PETER ROSSKY, Rice University, DEJI AKINWANDE, ANANTH DODABALAPUR, Univ of Texas, Austin — Charged defects and impurities play a very important role in charge transport in graphene field-effect transistors (FETs). They influence the mobility, residual doping, and the Dirac voltage. Long-range scattering by charged impurities in fabricated graphene FETs lowers the mobility of charge carriers, while short range scattering affects the value of residual carrier concentration. Our group has shown that the electrical properties of graphene FETs are significantly improved upon exposure to fluoropolymers or polar organic vapors. We have demonstrated favorable Dirac voltage shifts, increases in mobility, and reduction in residual carrier concentration as a result of polar molecules altering the dielectric environment surrounding the graphene/substrate interface of a graphene FET. Screening of charged impurity scattering is hypothesized to be the principal effect by which the polar molecules of the altered dielectric layer bring about improvements. We employ computational chemistry to model polar organic molecule-graphene systems. Such modeling will help explain experimental results.

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