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Measurements of the energy gap in biased bilayer graphene[1]
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— The application of bilayer graphene in logic-based electronics necessitates the demonstration of reliable bandgap opening, a matter complicated by charge inhomogeneity and midgap states due to local impurities and other disorder. We use dual-gated field effect transistor (FET) and planar tunnel junction devices prepared on mechanically exfoliated bilayer graphene flakes to probe the temperature dependent resistivity and density of states near the charge neutrality point. In both devices, the Fermi level and theoretical bandgap width are simultaneously controlled with a perpendicular displacement field. We report that at high displacement fields and with the Fermi level at the charge neutrality point, the temperature dependence of the resistivity follows a simple thermal activation across a gap width of up to 110 meV at high temperatures. Low temperature transport is dominated by hopping channels whose presence also increase conductivity at high temperatures, reducing the achievable σ_{ON}/σ_{OFF} ratio, a value of great interest for FET devices. We explore the role of charged impurities found in the deposited dielectric in limiting FET performance in this respect.

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