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Chemically functionalized graphene for bipolar electronics[1]
BERNARD MATIS, National Research Council/Naval Research Laboratory, JEFFREY BALDWIN, BRIAN HOUSTON, Naval Research Laboratory, NAVAL RESEARCH LABORATORY TEAM — We discuss the use of chemical functionalization, in particular hydrogenation, to achieve control of the local carrier type and density in graphene, which is a prerequisite for the development of graphene-based bipolar electronics. Transport measurements are used to demonstrate independent carrier types and densities within adjacent semi-metallic graphene and semiconducting hydrogenated graphene regions. Measurements of the Hall coefficient confirm that the graphene and hydrogenated graphene charge carriers change sign about the charge neutrality point, that the graphene carrier density retains its linear dependence on a back gate voltage, and reveal that the hydrogenated graphene carrier density deviates from such a linear relationship. Measurements across the bipolar interface reveal an increasing resistance for higher hydrogen concentrations and a source of constant resistance across a range of back gate voltages for lower hydrogen concentrations.

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