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Controllable P-N Junctions in Graphene-Ferroelectric Devices J. HENRY HINNEFELD, Univ of Illinois - Urbana, RUIJUAN XU, University of California - Berkeley, STEVEN ROGERS, MOONSUB SHIM, Univ of Illinois - Urbana, LANE MARTIN, University of California - Berkeley, NADYA MASON, Univ of Illinois - Urbana — Graphene's linear dispersion relation and the attendant implications for bipolar electronics applications have motivated a range of experimental efforts aimed at producing p-n junctions in graphene. Recent experimental results indicate that the electrical polarization in ferroelectric substrates can modify the local doping in graphene, via a hysteretic gating effect. Here, we exploit this effect to create variably doped local regions in a graphene device having a single, universal back-gate. By patterning devices on a partially shielded ferroelectric substrate, we show through electrical transport measurements that p-,i- and n-doped regions can be induced in the system. We explore the competing effects of substrate polarization and interfacial charge-trap processes that contribute to this behavior, along with the time evolution of the effect and its dependence on the measurement conditions and device parameters.

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