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Fabrication and characterization of graphene PN junctions[1] DENNIS WANG, XIAODONG ZHOU, ALI DADGAR, Columbia Univ, PRATIK AGNIHOTRI, JI UNG LEE, The State University of New York, Albany, MARK REUTER, FRANCES ROSS, IBM T.J. Watson Research Center, ABHAY PASUPATHY, Columbia Univ — Theoretical predictions of relativistic Klein tunneling and Veselago lensing in graphene have inspired efforts to fabricate graphene p-n junctions where such phenomena could be realized and studied via electronic transport or scanning tunneling microscopy (STM). Here we will discuss the interplay between device geometry and our measurements in a 4-probe STM, which allows for simultaneous back gating, biasing, and scanning of a micromechanically exfoliated graphene sample. A sharp p-n junction is essential to the manifestation of these aforementioned effects, and we examine the benefits and drawbacks of several routes toward this goal from a fabrication standpoint. These methods include lithographically pre-patterned substrates and the stacking of vertical heterostructures. Finally, we will describe our subsequent characterization results for each, including information about topography and spatial mapping of the density of states.

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