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Graphene-Silicon Schottky Diodes CHUN CHUNG CHEN, MEHMET AYKOL, CHIA-CHI CHANG, A.F.J. LEVI, STEPHEN B. CRONIN, University of Southern California — By depositing mechanically exfoliated graphene on top of silicon substrates, the graphene-silicon Schottky barriers are observed. The resulting current-voltage characteristics exhibit rectifying diode behavior with a barrier energy of 0.41 eV on n-type silicon and 0.45 eV on p-type silicon at room temperature. The ideality factor is also evaluated for bilayer, three layer, and multiple layer graphene-silicon Schottky diodes at various temperatures. These results indicate that the number of graphene layers and the ambient temperature are major influences for the ideality factor of graphene-silicon Schottky diodes. In this work, photocurrents are observed under 532 nm laser illumination. The transparency of the thin graphene layer allows the underlying silicon substrate to absorb the laser light and generate a photocurrent. The full current-voltage characteristics under illumination are also reported. Spatially resolved photocurrent measurements also reveal the importance of inhomogeneity and series resistance in these devices.

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