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Tuning the Schottky barrier across graphite/semiconductor junctions by bromine intercalation[1] S. TONGAY, X. MIAO, T. SCHUMANN, A. F. HEBARD, University of Florida — We report *in situ* tuning of the Schottky barrier height (SBH) formed at graphite/semiconductor (semiconductor = n-Si, 4H-SiC) interfaces by exposing completed junctions to Br vapor. The Br, which acts like an acceptor, intercalates into the graphite and hole dopes the graphene planes. The studied Schottky diodes display lower forward/reverse current density and higher depletion capacitance after the Br intercalation. Capacitance-voltage measurements confirm 0.3 - 0.4 eV increases in the SBH, consistent with Br-induced changes in the graphite work function deduced from the Mott-Schottky relations and measured by X-ray photoemission spectroscopy. The lowering of the graphite Fermi energy, or equivalently the raising of the graphite work function, is attributed to the increase in the density of mobile hole carriers resulting from electron transfer from the carbon planes to the Br intercalates. These results have implications for HEMTs, MESFET devices, sensing, and high power applications as well as graphene electronics, since the outermost layer of graphite in contact with the semiconductor is a single sheet of carbon atoms.

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