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Spatial fluctuations in barrier height at the graphene-silicon carbide Schottky junction[1] SHIVANI RAJPUT, MINGXING CHEN, YING LIU, YAOYI LI, MICHAEL WEINERT, LIAN LI, University of Wisconsin, Milwaukee — When graphene is interfaced with a semiconductor, a Schottky contact forms with rectifying properties. Graphene, however, is also susceptible to the formation of ripples upon making contact with another material. In this work, we report intrinsic ripple- and electric field-induced effects at the graphene-semiconductor Schottky junction, by comparing chemical vapor deposited graphene transferred onto semiconductor surfaces of opposite polarization: the hydrogen-terminated Si and C- faces of α-SiC. Using scanning tunneling microscopy/spectroscopy and first-principles calculations, we show the formation of a narrow Schottky dipole barrier approximately 10 Å wide, which facilitates the observed effective electric field control of the Schottky barrier height. We further find atomic-scale spatial fluctuations in the Schottky barrier that directly follow the undulation of ripples on both graphene-SiC junctions. These findings reveal fundamental properties of the graphene/semiconductor Schottky junction.

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