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Temperature and bias dependence of barrier heights in graphene / semiconductor Schottky diodes under reverse bias DUSHYANT TOMER, SHIVANI RAJPUT, LAWRENCE HUDY, LIAN LI, Univ of Wisconsin, Milwaukee — Sensors based on graphene / semiconductor Schottky diodes have shown significant enhancement in sensitivity over field effect devices when operated under reverse bias, where the conductivity has an exponential dependence on the Schottky barrier height. In this work, chemical vapor deposited monolayer graphene is transferred onto Si- and C-face of hexagonal SiC, Si(111), and GaAs(001) substrates, as confirmed by scanning tunneling microscopy. Temperature and bias dependence of the barrier height are obtained by current-voltage measurements between 250 and 340 K. For all four junctions, the barrier increases linearly with temperature. However, as a function of reverse bias, it decreases linearly for graphene / SiC, but exhibits a nonlinear dependence for graphene / (Si, GaAs) Schottky junctions. These findings and their implication on the performance of sensors based on graphene/semiconductor Schottky diodes will be discussed at the meeting. Supported by U.S. Department of Energy, Office of Basic Energy Sciences, Division of Materials Sciences and Engineering under Award DE-FG02-07ER46228..

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