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**Gate Tunable Graphene-Silicon Ohmic/Schottky Contact** CHUN CHUNG CHEN, CHIA CHI CHANG, ZHEN LI, ANTHONY LEVI, STEVE CRONIN, University of Southern California — We have recently demonstrated gate tunable graphene-silicon Schottky diodes, in which the low bias conductance can be varied by more than three orders of magnitude [1,2]. Here, we deposit graphene on silicon substrates and observe the rectifying $I-V$ characteristics in graphene-silicon junctions, indicating the formation of Schottky junction due to the mismatch of their work functions. By applying a polymer electrolyte gate to the graphene surface, the Fermi energy of the graphene can be shifted $\pm$ 0.85eV from its charge neutrality point ($-4.6$eV) to match the conduction ($-4.01$eV ) or valence band ($-5.13$eV) of silicon to reduce the Schottky barrier and result in Ohmic contacts with both $n$- and $p$-type silicon. The $I-V$ characteristics observed under light illumination also indicate that the short circuit current can be increased or decreased by varying graphene-silicon work function difference, further demonstrating that the graphene-silicon junction and be changed between Schottky and Ohmic contact.

[1] Chen, Aykol, Chang, Levi, and Cronin, "Graphene-Silicon Schottky Diodes." Nano Letters, 11, 1863-1867 (2011).
[2] Chen, Chang, Li, Levi, Cronin, "Gate Tunable Graphene-Silicon Ohmic/Schottky Contacts." Applied Physics Letters, accepted (2012).

Chun Chung Chen
University of Southern California

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