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Thermoelectric characterization of large area graphene grown on SiC RUWANTHA JAYASINGHE, ANDRIY SHEREHIY, GAMINI SUMANASEKERA, University of Louisville, ANTON SIDOROV, ZHIGANG JIANG, Georgia Institute of Technology, JOSEPH TEDESCO, KURT GASKILL, Naval Research Laboratory — The thermoelectric power (TEP) of the epitaxially grown large area graphene was studied. Graphene multi-layers were obtained on C- terminated surfaces of 4H-SiC while monolayers of graphene were obtained from Si- terminated surface of 4H-SiC by thermal decomposition. Electrostatic deposition technique was sequentially used to reduce the number of graphene layers from the C-face samples to a monolayer. We measured and compared the thermoelectric power of monolayer graphene on both Si-face and C-face of SiC. All investigated multi-layer graphene samples showed a positive Seebeck coefficient in ambient conditions and turned negative after vacuum-annealing at 550 K in a vacuum of 2 x 10^{-7} Torr. In contrast, monolayer graphene for both Si- and C- faces showed a relatively small negative Seebeck coefficient in ambient conditions and saturated at a greater negative value after vacuum-annealing. We also measured the response of the TEP while exposing the degassed graphene to various gases. Charge transfer effects were seen for both acceptor and donor type gasses. Finally the gate dependence of the TEP of the large area graphene was studied using a polymer top gate.

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