Abstract Submitted
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Growth and characterization of graphene films by halogen based plasma etching of 6H-SiC[1] CHARTER STINESPRING, ANDREW GRAVES, SAURABH CHAUDHARI, SRIKANTH RAGHAVAN, Department of Chemical Engineering, West Virginia University — The synthesis of graphene has received considerable attention due to its remarkable properties. We have developed a novel plasma based method for producing graphene films on silicon carbide. Specifically, CF_4 and Cl_2 based inductively coupled-reactive ion etching is used to selectively remove Si from the near surface layers of 6H-SiC(0001). The graphene film is then formed by rapid thermal annealing of this carbon rich layer at 970°C under atmospheric pressure argon or ultrahigh vacuum conditions. The composition, structure, and thickness of these films have been characterized using x-ray photoelectron spectroscopy, reflection high energy electron diffraction, Raman spectroscopy, and atomic force microscopy. The results indicate that the films are epitaxial with a thermally stable defects which buckle the graphene surface. The plasma parameters, most notably the bias voltage, are used to control the number of graphene layers. This allows reproducible synthesis of one, two, and three layer graphene films. Metal-graphene-metal structures have been characterized using simple current-voltage measurements. These exhibit Schottky type behavior. We believe this may be due to semiconducting behavior produced by the observed defect structures.

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