Characterization of Graphene Films and Ribbons on Silicon Carbide TIANBO LI, ASMEROM OGBAZGHI, XUEBIN LI, ZHIMIN SONG, CLAIRE BERGER, WALT DE HEER, PHILLIP FIRST, Georgia Institute of Technology — Ultrathin graphite films, 1-6 graphene layers thick, were grown on both the Si-terminated (0001) and C-terminated (000¯1) faces of 4H- and 6H-SiC via thermal desorption of silicon in UHV. Through investigations of the thinnest films (monolayer graphene) by LEED and STM, we show the existence of a complex $\sqrt{3}\times\sqrt{3}R30^\circ$ reconstructed layer between the lowest graphene layer and the SiC substrate. The $6\sqrt{3}\times6\sqrt{3}R30^\circ$ LEED pattern obtained after annealing above 1250°C can be explained predominantly by kinematic scattering from the slightly $6\times6$ corrugated graphene, from the reconstruction, and from the SiC substrate. Low-order double-scattering is required to explain all of the diffraction features. LEED and STM on graphene ribbons patterned from these films (80-400 nm width) show that graphene layers remain intact after photolithography and plasma etching.

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