Abstract Submitted
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Surface reconstruction and graphene formation on face-to-face 6H-SiC at 2000 °C RANDOLPH E. ELMQUIST, MARIANO REAL[1], BRIAN G. BUSH, TIAN SHEN, MARK D. STILES, ERIC A. LASS, National Institute of Standards and Technology — Improved epitaxial graphene films have been widely reported when the sublimation rate of Si is reduced by ambient Ar gas, vapor phase silane, or confined Si vapor. We describe graphene growth on (0001) 6H-SiC samples annealed "face-to-face" [1]; in our modified method the separation is limited only by the flatness of the surfaces. After annealing in 100 kPa Ar gas at 2000 °C for 300 s, atomic force microscopy (AFM) and electrostatic force microscopy (EFM) show graphene coverage is typically between one and a few layers. Samples without prior hydrogen etching undergo surface reconstruction in the graphitization process, resulting in atomically flat terraces with step bunching. Estimates of the sequestered carbon in the form of graphene are compared to calculated levels due to sublimation and diffusion rates where the sublimated gas is dominated by Si atoms below 2100 °C. The 2000 °C samples are contrasted against samples processed between 1700 °C and 1900 °C and transport results on large-scale graphene devices are presented.

[1] X.Z Yu, C.G. Hwang, C.M. Jozwiak, A. Kohl, A.K. Schmid and A. Lanzara, New synthesis method for the growth of epitaxial graphene, Journal of Electron Spectroscopy and Related Phenomena 184 (2011) 100-106.

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