Abstract Submitted
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Control of epitaxial graphene growth by SiC-SiC capping[1] ISMET KAYA, CEM CELEBI, CENK YANIK, ANIL GUNAY DEMIRKOL, Sabanci University, QUANTUM TRANSPORT AND NANOELECTRONICS LABORATORY TEAM — The growth of epitaxial graphene on the surfaces of silicon carbide is considered to be one of the most promising techniques for obtaining high quality large scale graphene for electronics applications. Although graphene grown on the C-face has high mobility, its growth under vacuum is too fast, not self limited and produces high concentration of crystalline defects. Therefore a precise control over the Si evaporation rate is required. We demonstrate a new method to reduce the growth rate and yield thin graphene layers with excellent thickness uniformity on the C-face of SiC in ultra high vacuum conditions. The sample is capped by another SiC substrate with a rectangular recess of about one micron depth on its surface which forms a partially open cavity between the surfaces. During the growth by high temperature annealing, silicon atoms sublimated from the capped sample are confined inside the cavity between the two substrates. The confined silicon vapor maintains a high partial pressure at the sample surface which significantly reduces the growth rate of graphene to an easily controllable range. We demonstrate that the growth rate linearly increases with the area of the cavity opening. We investigated the effect of Si confinement on the thickness and morphology of UHV grown epitaxial graphene on C-face SiC by Raman spectroscopy, atomic force microscopy, scanning electron microscopy and low energy electron diffraction.

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