

Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Effect of Ar Overpressure Ratio on the Growth of Graphene on Cu(111)¹ HEIKE GEISLER, SEAMUS MURRAY, SUNY College at Oneonta, ENG WEN ONG, TYLER MOWLL, University at Albany-SUNY, PARUL TYAGI, Global Foundaries, CARL A. VENTRICE, JR., SUNY Polytechnic Institute — A graphene growth study was performed on Cu(111) in a UHV chamber by CVD using ethylene. The sample holder consisted of an oxygen series button heater with Ta heat shields to allow annealing the crystal to 900 °C at pressures as high as 100 mTorr. The crystal structure of the surface was determined using LEED. Growth attempts on the clean Cu(111) surface at ethylene pressures as high as 5 mTorr only resulted in trace amounts of graphene being grown on the surface. This is attributed to the low catalytic activity of the Cu(111) surface and the high vapor pressure of Cu at the growth temperature. To suppress the sublimation of Cu, an Ar overpressure was used. Ethylene partial pressures of 2, 5, 10, and 50 mTorr were used, keeping the total pressure at 50 mTorr. The films for 2 and 5 mTorr showed predominately single domain epitaxy. At 10 mTorr ethylene partial pressure, additional diffraction spots 30° out of phase with the Cu(111) substrate were observed. At 50 mTorr of ethylene and no Ar overpressure, broad diffraction arcs were observed in LEED that were ±15° out of phase with the substrate. Therefore, the carbon deposition rate, which depends on the ethylene partial pressure, has a large effect on the quality of the graphene film.

¹This research was supported by the NSF (DMR-1006411).

Carl A. Ventrice, Jr.
SUNY Polytechnic Institute

Date submitted: 14 Nov 2014

Electronic form version 1.4