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Controlling the Thermal Decomposition of Silicon Carbide into Graphene[1] DAVID TORRANCE, TIEN HOANG, DAVID MILLER, BAIQIAN ZHANG, WALT DE HEER, PHILLIP FIRST, Georgia Institute of Technology — The quality of epitaxial graphene films grown by thermal decomposition of silicon carbide depends on experimental control of the net silicon desorption rate. Such control has been previously demonstrated by three techniques: tight confinement within an induction furnace, growth in 1-atm Ar buffer gas, or introduction of a silane overpressure. Our goal is to study the physics of these methods. We have constructed an all-graphite UHV induction furnace with maximum temperature over 1700° C and gas handling that allows process gas pressures from UHV to 1 atm. Sample holders with different orifices are used to vary the furnace confinement. Our initial systematic measurements of the effect of Ar buffer gas pressure establish that the silicon sublimation rate is adequately described by a 1D diffusion model with geometry-dependent parameters.

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David Torrance
Georgia Institute of Technology

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