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Steps in Cu(111) thin films affect graphene growth kinetics DAVID L. MILLER, WILL GANNETT, MARK W. KELLER, National Institute of Standards and Technology — The kinetics of chemical vapor deposition of graphene on Cu substrates depend on the relative rates of C diffusion on the surface, C attachment to graphene islands, and removal of C from the surface or from graphene islands by etching processes involving H atoms. Using Cu(111) thin films with centimeter-sized grains [1], we have grown graphene under a variety of conditions and examined the edges of graphene islands with SEM and AFM. The Cu surface shows a series of regular steps, roughly 2 nm in height, and the graphene islands are diamond-shaped with faster growth along the edges of Cu steps. In contrast, growth on polycrystalline Cu foils under the same conditions shows hexagonal graphene islands with smooth edges.

[1] D. L. Miller, M. W. Keller, J. M. Shaw, K. P. Rice, R. R. Keller, and K. M. Diederichsen, "Giant secondary grain growth in Cu films on sapphire," AIP Advances, vol. 3, p. 082105, 2013.

Mark W. Keller
National Institute of Standards and Technology

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