abstract
Pristine, single-crystalline graphene displays a unique collection of remarkable electronic properties that arise from its two-dimensional, honeycomb structure. The inexpensive, scalable growth of graphene by chemical vapor deposition on metal substrates, specifically Cu, has accelerated graphene research; however, the underlying mechanisms for growth remain unclear. Using in-situ low-energy electron microscopy, we have investigated the growth behavior of two-dimensional graphene islands on a variety of metals. We find that the growth-limiting step depends on both metal species and substrate orientation. Islands on Cu surfaces can be formed from multiple domains, which collectively display a range of rotational variants with respect to the substrate. Likewise, islands on Ir(111) are composed of rotated and aligned domains that grow by carbon cluster attachment to kinks. These observations reflect the importance on growth behavior of the interaction between the edge of a graphene island and the substrate. One of the most striking examples of this is graphene grown on Au (111) in which nearly all islands can be identically aligned with respect to each other and to the Au substrate. The implications of these results for other materials systems will be discussed.

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biosketch
Oscar Dubón is Professor of Materials Science & Engineering (MSE) and Associate Dean for Equity and Inclusion in the College of Engineering at U.C. Berkeley. In addition, he is Faculty Scientist at the Lawrence Berkeley National Laboratory. He earned his B.S. from U.C.L.A. and his M.S. and Ph.D. from U.C. Berkeley, all in MSE. After postdoctoral appointments at U.C. Berkeley and Harvard University, he joined the Berkeley faculty in 2000. Dr. Dubón is recipient of the 2000 Robert Lansing Hardy Award from the Minerals, Metals & Materials Society, a 2004 CAREER Award from the National Science Foundation, and the 2004 Presidential Early Career Award for Scientists and Engineers. His research focuses on elucidating the relationship between defects and properties in electronic materials. In his role of Associate Dean, Dr. Dubón leads the College-wide efforts to foster a more welcoming and diverse engineering community at Berkeley.