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Angle-resolved Photoemission Study of Epitaxial Graphene on Cu(111)

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Copper is considered to be the most promising substrate, especially Cu(111), for the growth of high quality monolayer graphene. Since interactions between graphene and Cu substrates will influence on the orientation, quality, and electrical properties of synthesized graphene, we experimentally determine a weak interfacial interaction between Cu(111) substrate and graphene using angle-resolved photoemission spectroscopy (ARPES). The measurement was conducted from the initial stage to the formation of a graphene monolayer. Graphene growth was initiated along the Cu(111) lattice, and two rotated graphene domains were grown, where no significant differences were observed in the band structure depending on different orientations. The interaction, including electron transfer from the Cu(111) to graphene, was limited between the Shockley state of the Cu(111) surface and the π bands of graphene. These results provide direct information on the growth behavior and interactions between the Cu(111) and graphene.

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