

The origin of polycrystalline domain in CVD-grown graphene on copper

김대우, 정희태*, 김선준, 최형욱
한국과학기술원
(heetae@kaist.ac.kr*)

In spite of intensive research progress in CVD-grown graphene on copper, the most important issue is still unresolved: What is the relationship between the structure-morphology of Cu domain and CVD-grown graphene domain? This is critical to achieve high quality of monolayer graphene with the excellent carrier mobility and thermal/mechanical properties. Because graphene grows on the Cu surface, the effects of Cu crystal orientation on the kinetics of graphene growth and polycrystalline graphene formation are intuitively suspected. Here, we demonstrate that Cu (111) plane is the most important parameter to determine the domain structure and properties of graphene: Optical birefringence, electron-backscatter diffraction (EBSD) and transmission electron microscopy (TEM) results of graphenes grown on various Cu substrates show that the size and shape of the grown graphene domains are mostly well matched with those of underlying Cu (111) domains. While other Cu domains such as (100) and (101) also influence the domains structure of graphene leading to the similar shape of Cu domain, grown graphenes on these Cu domains are mainly composed of small domains.