Epitaxy growth of penetrated atomic interaction through two-dimensional materials

김성규[1]

[1]나노신소재공학과, 세종대학교

E-mail: sungkyu@sejong.ac.kr

Based on the recently introduced remote epitaxy technologies, atomic interaction through monolayer graphene is governed by polarity. The polarity of a atomic bond is determined largely by the relative electronegativities of the bonded atoms. From remote homoepitaxy of a GaAs epilayer, the ionic field formed from the substrate penetrates monolayer graphene to generate atomic interaction between the substrate and epitaxy materials. Although the previous studies show the well-defined orientation of grown films, direct observation of atomic interaction though a graphene is not clearly understood.

Here, we demonstrate the origin of remote epitaxy in III-V compound semiconductors using atomic-resolution scanning transmission electron microscopy (STEM). The remotely grown epilayer not only shows a dramatically reduced defect density, but also suppressed the deformation of the interface which has a high strain energy caused by a large lattice mismatch. These findings provide crucial evidence to explain the origin of remote epitaxy, which could eventually broaden epitaxy-based electronics.

Keyword: remote epitaxy, atomic interaction, defect density, graphene