SF2-05

Scanning Tunneling Microscopy Study on the Initial Stage of the Graphene Growth on the Vicinal 6*H*-SiC(0001) Surface

김일유[1], 조은진[1], 황찬용[2], 김원동[2]

[1]전남대학교 물리학과, [2]한국표준과학연구원

Graphene nanoribbons (GNR) are currently considered as one of the most promising materials for future quantum devices, due to their exceptional ballistic transport properties and the controllable electronic structures depending on the edge structure and the width. We investigated the possibility of the growth of GNR on the vicinal 6H-SiC (0001) surface using Scanning Tunneling Microscopy (STM), Low energy electron diffraction (LEED) and Auger electron spectroscopy (AES). The substrates sliced from a 3.5 degree off-axis 6H-SiC(0001) wafer were introduced to the ultra high vacuum chamber, where they were prepared for the growth of graphene layers by removing the natural oxide layers with the standard method using Si flux. At each step of the growth process, the LEED patterns and AES spectra were measured to calibrate the thickness of the graphene layers. Before the growth, the long range ordering of the steps on the surface was confirmed by the splitting of spots of LEED pattern. However, this long range ordering almost disappeared right after starting the graphitization of the surface. STM experiment was performed to obtain the information of atomic structure of the surface during graphitization process. We observed the short range ordering of the steps on the surface with the terraces covered by graphene layer patches. At the very early stages of growth, it was found out that ribbon-like single layer graphenes with atomically sharp edges were formed on the terraces of reconstructed carbon nanomesh structure. With increasing the substrate temperature, the graphene patches grow continuously in area and finally formed the carpet-like structures over the steps. Scanning tunneling spectroscopy experiment was also carried out over the graphene patches to examine the existence of the local electronic states at the edge structures.