

Abstract Submitted
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Energy Efficient Growth of Epitaxial Graphene on Hexagonal SiC Surface with Molybdenum Plate Capping during UHV Annealing¹
KIBOG PARK, HAN BYUL JIN, YOUNGEUN JEON, SUNGCHUL JUNG, VI-JAYAKUMAR MODEPALLI, HYUNG-JOON SHIN, JUNG-WOO YOO, SUNG YOUNG KIM, SOON-YONG KWON, UNIST, HYUN SUK KANG, BYUNG CHEOL LEE, KAERI, JAE-HYEON KO, Hallym University, DAEJIN EOM, KRISS — The quality of epitaxial graphene (EG) grown on a hexagonal SiC substrate is found to be improved greatly by capping the surface with a molybdenum plate (Mo-plate) during UHV annealing. The significant reduction of D-peak and increase of 2D-peak in the measured Raman spectra, compared with the spectra for no capping, confirm the crystallinity enhancement of EG film grown with Mo-plate capping. Mo-plate capping is considered to induce heat accumulation on SiC surface by thermal radiation mirroring and raise Si partial pressure near surface by confining the sublimated Si atoms between SiC substrate and Mo-plate. These two phenomena can cooperatively facilitate an environment favorable for growing high-quality EG films. A top-gated field effect transistor is fabricated on EG film grown on Si-face 6H-SiC surface at ~ 950 degree C, showing the field effect mobility of ~ 1800 cm²/Vs. With no need to heat the entire SiC substrate to high temperature over 1300 degree C as in the conventional annealing under UHV or Ar atmosphere, the Mo-plate capping can be an efficient method to reduce energy consumption significantly in growing high quality EG films.

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