[Ⅲ~12][젊은진공과학자상 후보]

# The Penetration Range of Low Energy (50-500 eV) $Ar^+$ and $Kr^+$ Ions Impinging onto a Graphite Surface studied by the Oxidative Etching Method and STM

한 재량, 강 헌
포항공과 대학교 화학과

Thermal oxidative etching of graphite surface defects, produced by low energy (50~500 eV) collision of $Ar^+$ and $Kr^+$ ions, leads to formation of pits with a nearly circular shape. The ion bombardment at low energy produces carbon vacancy defect (VD) and interstitial defect (ID) formed by trapping of one incident atom between the basal planes. The probabilities for the pit formation are measured from both VD and ID. Most of the VD's (> 90 %) are developed into pits by thermal oxidation, while only low percentage (< 15 %) of ID is converted to pits. The etching process from a multi-layer defect removes the carbons at and above the defect-containing layer simultaneously, thus enabling us to locate the depth of the ion-generated defects from STM topography of the pits. The fraction of multi-layer pits increases with ion energy. From the statistical analysis of the depth distribution of pits the threshold energies are obtained for penetration into the second and third graphite layers and for vacancy production at the second layer. The experimental depth distribution is consistent with the result of theoretical calculation. Lateral displacement of the incident ion inside basal planes, after penetration into the first layer, is measured from the distance between a pair of vacancy and interstitial. The average distance of lateral travel varies with the incidence angle and the mass of ion.