Computational Research of Diamond-like Carbon Film Growth

Minwoong Joe, Myoung-Woon Moon, and Kwang-Ryeol Lee*

Computational Science Center, Korea Institute of Science and Technology, Seoul 136-791

We have investigated early stage growth of amorphous carbon using molecular dynamics simulation with various energies (1 – 100 eV) and incidence angles (0° – 70°) of C bombardments. At low energy (1 eV) the film growth is mainly occurred only in utmost surface, which leads in most porous structure and tensile stress induced. While as the energy increases (75 eV), subplantation starts to have major role to the film formation so that compressively-strained and denser films are developed. At grazing incidences (60° and 70°), sloped mound was observed in contrast with smooth surface at near-normal incidences. Moreover the growth front was oriented to the source in good agreement with those typically obtained in glancing angle deposition, the tilted columnar structures. The average displacement vector for surface atoms indicates clear anisotropy, which suggests impact-induced rearrangements could be responsible for both planar and nonplanar surface growth.