[I-7] [초청]

## Formation of Amorphous Diamond Film by Energetic Condensation

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Trends in recently reported data on high $sp^3$ fraction (up to 90%) nonhydrogonatod amorphous diamond like carbon films deposited by ion beam, ion beam sputtering, and laser vaporization, are examined. The degree of diamondlike film character is found to depend upon the deposition technique as well as the substrate temperature and thermal diffusivity. The date suggest that the combination of incident particle kinetic energy and surface accommodation determine the physical propertics of the resultant film. A model is proposed for the codensation of energetic carbon atoms into diamondlike films in which a quench-type surface accommodation mechanism is operative. Hard carbon films can be prepared by the condensation of energetic carbon species at and below room temperature. These amorphous films are primarily tetrahedrally coordinated and contain high fractions of $sp^3$ bonding leading to the terminology amorphous diamond. Field emission from these and ather forms of carbon has been considered previousiy, but is generally unstable or based on surgace treatments which limit their operating conditions. We report electron emission from Cs containing amorphous diamond films at applied fields as low as 7 volts per micron. This emission characteristics is relatively insensitive to surface treatment; films left under ambient laboratory environment for more than six months show these favorable characteristics with no pretreatment. We describe the fabrication process and emission of these films.