

Influence of Neutral Particle Beam Energy on the Structural Properties of Amorphous Carbon Films Prepared by Neutral Particle Beam Assisted Sputtering

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The effects of argon neutral beam (NB) energy on the amorphous carbon (a-C) films were investigated, while the a-C films were deposited by neutral particle beam assisted sputtering (NBAS) system. The energy of neutral particle beam can be controlled by reflector bias voltage directly as a unique operating parameter in this system. The deposition characteristics of the films investigated of Raman spectra, UV-visible spectroscopy, electrical conductivity, stress measurement system, and ellipsometer indicate the properties of amorphous carbon films can be manipulated by only NB energy (or reflector bias voltage) without changing any other process parameters. We report the effect of reflector bias voltage in the range from 0 to -1KV. By the increase of the reflector bias voltage, the amount of cross-linked sp² clusters as well as the sp³ bonding in the a-C film coated by the NBAS system can be increased effectively and the composition of carbon thin films can be changed from nano-crystalline graphite phase to amorphous carbon phase.

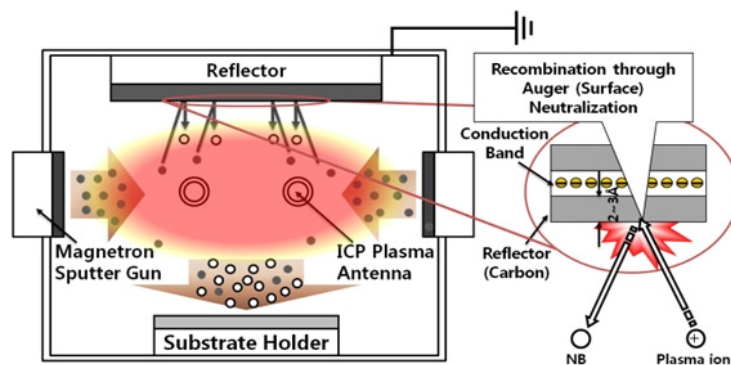


Fig. 1. Conceptual diagram of NBAS system and mechanism of neutral beam generation.

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