

Nitrogen-Doped Ultrananocrystalline Diamond/Hydrogenated Amorphous Carbon Composite Films Prepared by Coaxial Arc Plasma Deposition

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Abstract : Diamond is one of the most interesting semiconducting carbon materials owing to its unique physical and chemical properties, yet its application in electronic devices is limited due to the difficulty of realizing n-type conduction by nitrogen doping. In contrast Ultrananocrystalline diamond with diamond grains of about 3-5 nm in diameter have attracted much attention for device-oriented applications because they may enable the realization of n-type doping with nitrogen. In this study, nitrogen-doped Ultra-Nanocrystalline diamond films were prepared by coaxial arc plasma deposition (CAPD) method, the nitrogen content was estimated by X-ray photoemission spectroscopy (XPS). The electrical conductivity increased with increasing nitrogen contents. Heterojunction diodes with p-type Si were fabricated and evaluated based on current-voltage (I-V) and capacitance-voltage (C-V) characteristics measured in dark at room temperature.

Keywords : heterojunction diodes, hopping conduction mechanism, nitrogen-doping, ultra-nanocrystalline diamond

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