

Abstract Submitted
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Influences of Arc Discharge Repetition Rate on Growth of Ultrananocrystalline Diamond / Hydrogenated Amorphous Carbon Composite Films by a Coaxial Arc Plasma Gun TOMOHIRO YOSHIDA, KENJI HANADA, YOU NAKAGAWA, Kyushu University, RYOTA OHTANI, KAZUSHI SUMITANI, HIROYUKI SETOYAMA, EIICHI KOBAYASHI, SAGA Light Source, YOSHIAYUKI AGAWA, ULVAC-RIKO, TSUYOSHI YOSHITAKE, Kyushu University — Ultrananocrystalline diamond/hydrogenated amorphous carbon composite (UNCD/a-C:H) films comprising UNCD crystallites with diameters less than 10 nm and a a-C:H matrix have received a lot of attention because of their unique properties. The growth mechanism in this method must differ from that of CVD because of the completely different film preparation conditions. The growth mechanism deserves to be studied. In this study, UNCD/a-C:H films were prepared by using a coaxial arc plasma gun at different repetition rates of arc discharge. The influences of the repetition rate on the growth were structurally studied. With an increase in the repetition rate from 1 to 5 Hz, the UNCD crystallite size estimated from the X-ray diffraction peaks increased from 1.9 to 2.6 nm. The $sp^3/(sp^2 + sp^3)$ value estimated from the X-ray photoemission spectra also increased, which might be attributed to the enlarged UNCD crystallites. While the deposition by arc discharge occurs in pulsed process, the growth of UNCD crystallites takes place not independently but continuously.

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