

Abstract Submitted
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Formation of Ultrananocrystalline Diamond/Amorphous Carbon Composite Films in Vacuum by Using A Coaxial Arc Plasma Gun TSUYOSHI YOSHITAKE, KENJI HANADA, TOMOHIRO YOSHIDA, YOU NAKAGAWA, Kyushu University, RYOTA OHTANI, KAZUSHI SUMITANI, HIROYUKI SETOYAMA, EIICHI KOBAYASHI, Saga Light Source — We have previously reported that ultrananocrystalline diamond/hydrogenated amorphous carbon composite (UNCD/a-C:H) films are formed in a hydrogen atmosphere by pulsed laser deposition. The UNCD crystallite formation by PLD necessitates the hydrogen atmosphere. Recently we have succeeded in forming UNCD/a-C:H films by coaxial arc plasma deposition (CAPD). In CAPD, a supersaturated condition should be strongly realized as compared to that in PLD. Here, we report that UNCD/amorphous carbon composite (UNCD/a-C) films can be formed in vacuum by CAPD. Formation of UNCD crystallites was confirmed by X-ray diffraction. The crystallite size was estimated to be 1.6 nm using Scherrer's equation. This value is smaller than that (2.3 nm) of the UNCD/a-C:H film deposited in the hydrogen atmosphere. The $sp^3/(sp^2 + sp^3)$ value estimated from the X-ray photoemission spectrum and the hardness measured by nanoindentation were nearly same as those of the UNCD/a-C:H film.

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