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Diamond and DLC Thin Film Preparation by Microwave Plasma Chemical Vapor Deposition under the Open-Air Condition MASAHIRO TANAKA, HIDETSUGU YAGI, HIDEKI MOTOMURA, MASAFUMI JINNO, Ehime University — A diamond thin film has attractive properties such as high hardness, large heat conductivity etc. And, a DLC film has also interesting properties such as hardness, lubrication, chemical inertness. Microwave plasma chemical vapor deposition (MWPCVD) is an effective method for producing such a thin film. However, the deposition rate of the conventional low-pressure MWPCVD is very low. Authors have succeeded to produce a diamond thin film on a Si substrate with high deposition rate ($\sim$100μm/h) under the open-air condition, i.e. under the atmospheric pressure and without chamber, using microwave plasma system with a torch (electrode) of coaxial structure. Since the system has open-air structure, vacuum system is not required, which results low cost. In this study, we investigate the relationship between the quality and the experimental conditions synthesizing the diamond and the DLC film. The diamond film is synthesized under the methane concentration of 3-8%(CH4/H2 by volume) and the DLC film is synthesized under the methane concentration of above 10%(CH4/H2 by volume).

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