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Plasma CVD synthesis of new diamond-bismuth thin films by solid-source immersion TAKAHIRO TAMURA, Faculty of Engineering, Hokkaido University — Doping various elements to carbon is gathering much attention recently. In particular, doping to diamond is attractive for various applications, but it is extremely difficult except for a very few numbers of elements (e.g. N, P and B). Since the search for dopants and their combinations is still underway, a simple and versatile technique for the doping to the diamond has been awaited. We have developed a new method for the doping to diamond, which is simply immersing a solid source in the CVD plasma. We used this technique to examine the possibility to dope bismuth to the diamond. It was necessary to make a device to let bismuth seep into the CVD plasma because of its low melting temperature. The grown samples were characterized by X-ray fluorescence, X-ray diffraction, Raman spectroscopy, TEM, XPS and electrochemical cyclic voltammetry. We found nanoparticles of an unusual carbon allotrope (Chaoite) at grain boundaries of diamond microcrystals. Most of the bismuth was included among the nanoparticles. Molecule-like Raman spectra were observed from the film, which suggests the existence of various carbon nanostructures.

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