Geodynamics Seminar

第347回ジオダイナミクスセミナー

Microstructures of nanopolycrystalline diamond synthesized directly from highly crystallized graphite

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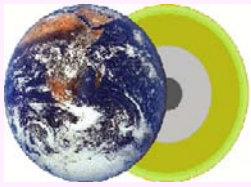
主催：愛媛大学地球深部ダイナミクス研究センター
日時：1/18（金）午後 4時30分～
場所：総合研究棟 4F 会議室



EHIME UNIVERSITY GRC GEODYNAMICS RESEARCH CENTER

Abstract

The excellent mechanical properties of nano-polycrystalline diamond (NPD) originate from its peculiar microtexture features. A series of related studies have shown that the conversion mechanism and resulting microtexture of NPD are strongly influenced by crystallinity of graphite starting materials. Various forms of carbon (polycrystalline graphite, finely milled graphite, glassy carbon, fullerene etc.) have been tested as starting materials for NPD synthesis using multianvil apparatus. However, systematic experiments to synthesize NPD from highly crystallized graphite have not yet been performed. In this study, an attempt has been made to synthesize NPD from well crystallized graphite starting materials using multianvil apparatus. Highly oriented pyrolytic graphite and kish graphite were used as starting materials, which were found to have completely converted to diamonds (cubic diamond with a trace amount of hexagonal diamond) at 15 GPa and 2300 ° C. TEM observation of the recovered products revealed that the diamond synthesized from HOPG is composed of nano-layered crystals and that from kish graphite consists of granular nanocrystals, respectively. In addition, these crystals in the products show preferred orientation toward the [111] of cubic diamond because the martensitic transformation takes place exclusively in the well crystallized graphite sources. The nano-layered texture observed in the diamond synthesized from HOPG reflects the original layered structure in the starting material, while the granular texture observed in that from kish graphite seems to originate in plastic deformation of the sample during the conversion process. In the seminar, mechanical properties of these diamonds will also be presented.

詳細は当センターホームページ: http://www.ehime-u.ac.jp/~grc/をご覧ください
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