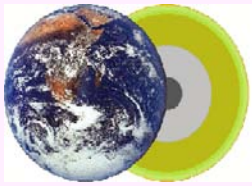
Geodynamics Seminar

第342回ジオダイナミクスセミナー

Transformation mechanism of graphite to hexagonal diamond-Influence of graphite crystallinity and hydrostaticity-

Tomoharu Yamashita
(Msc. Student, Ehime University)

主催：愛媛大学地球深部ダイナミクス研究センター
日時：11/16（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 phase transition mechanism of graphite → hexagonal diamond was studied based on XRD and TEM analyses of samples recovered from high pressure experiments conducted at 25 GPa, < 2000 ℃ using a laser-heated diamond anvil cell (DAC) and a Kawai-type 3000t multi-anvil apparatus. To investigate the influence of the initial crystallinity of graphite source on the transition mechanism, sevral types of graphite samples: Kish graphite (KG), highly oriented pyrolytic graphite (HOPG①/②/③), and pyrolytic graphite (PG①/②) were used. In addition, two series of runs were conducted using laser-heated DAC: 1) experiments using an ethanol/methanol (1:4) pressure transmitting medium, and 2) those without using pressure medium(direct sample loading), to also examine the influence of hydrostaticity during compression on the transition behavior and microtexture feature. XRD patterns obtained from the recovered samples showed that the products synthsised from well –crystalline graphite (Kish and HOPG) consist mostly of hexagonal diamond, while those obtained from pyrolitic graphite are a mixture of hexagonal diamond. TEM observations of those samples revealed that the former products show a layered texture which is originated from the initial texture of the graphite starting material, while the latter show granular to mosaic texture. These observation suggest that The Martensitic formation of hexagonal diamond and its mixture (as well as crystalliste size) depend strongly on the crystallite size (both in a- and c-axis direction) of the initial graphite sources. The hydrostaticity of samples under compression is likely not for the phase transition mechanism.

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
問い合わせ先：桑山 靖弘（TEL:089-927-8408,e-mail:kuwayama@sci.ehime-u.ac.jp）