Geodynamics Seminar

第371回ジオダイナミクスセミナー

Microtexture and formation mechanism of impact diamonds from the Popigai crater

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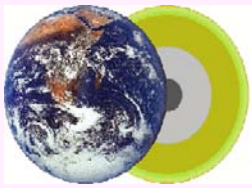
主催：愛媛大学地球深部ダイナミクス研究センター
日時：11/29（金）午後 4時30分～
場所：総合研究棟Ⅰ 4F 共通会議室



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Abstract

Diamonds formed by large meteoritic impact are generally called impact diamonds. Impact diamonds have been found in many giant craters such as the Popigai crater in Russia, Ries crater in Germany and Sudbury Basin in Canada. They are clearly different in terms of microtexture from mantle diamonds transported from the deep Earth by kimberlites. The formation mechanism of impact diamonds from the Popigai crater is considered to be martensitic transformation because most of them show tabular morphologies derived from the original graphite in a single crystal form. However, the microtexture of impact diamonds and its formation mechanism has not fully been clarified. Therefore, in this study we investigated the microtexture and its formation process through microtexture observation and crystallographic analysis of Popigai diamonds and also similar synthetic products as the counterpart.

In total 10 impact diamonds from the Popigai crater were examined by XRD, SEM and TEM. The samples show tabular morphologies with 0.5 mm in size and show opaque to translucent (yellowish) appearances. XRD analysis showed that most of the samples consist mainly of diamond and small-trace amounts of lonsdaleite. Two opaque samples are found to also contain graphite. 2D XRD patterns indicate strong preferred orientation of the constituent grains. Characteristic orientation relations were observed: Graphite [001]* // Lonsdaleite [100]* // Diamond [111]* by both XRD and TEM observations, suggesting that the martensitic mechanism is indeed responsible for the formation of Popigai diamonds. We will also present the variety of microtextures and preferred orientation features and discuss their origin.

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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