DIAMONDITE FORMATION IN CARBONATE-SILICATE MELTS OF NATURAL CARBONATITES (EXPERIMENTAL MODELING)

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The carbonatitic composition of parental media responsible for diamondite formation has been verified by the trace element abundances in silicates of natural diamondites (Kurat & Dobosi, 2000; Dobosi & Kurat, 2002) and by high-pressure high-temperature experiments on "carbonate-synthetic" diamondite formation in carbonate-carbon and carbonate-silicate-carbon melts of natural chemistry (Litvin & Spivak, 2003; Spivak & Litvin, 2004). Natural carbonatites of the Chagatai complex (Uzbekistan) with a high content of silicate components and eclogitic high-pressure mineralogy were used to simulate the carbonate-silicate medium parental for both diamondite and their syngenetic mineral inclusions. Experiments at a pressure of 8.5 GPa and temperature of 1800 °C show that diamondite was quickly formed in carbonate-silicate melts of Chagatai carbonatites with dissolved carbon. At pT conditions of diamondite formation, the mineralogy of Chagatai carbonatite consists of grossular-almandine garnet, diopside-hedenbergite clinopyroxene and calcite (aragonite) and resembles the mineralogy of diamond-bearing calcaceous eclogites and grospydites found in kimberlites as mantle xenoliths. Estimation of physico-chemical behavior of Chagatai carbonatite as parental medium for diamondite formation is of interest at conditions simulating to some extent formation of natural diamondites. The most important features of the process are: quick migration of highly mobile low viscosity carbonate-silicate melt to the zone of diamondite formation; extremely high "snowballing" rate of diamondite crystallization from carbonate-silicate melt oversaturated by dissolved carbon; formation of syngenetic inclusions of garnet and clinopyroxene, carbonate and sulfides, etc. Experiments show that formation of diamondite and syngenetic inclusions of silicate, sulfide, phosphate and other minerals inside the pores and caverns of diamondites is accompanied by coarse-grained crystallization of similar minerals in the parental medium surrounding the growing diamondites.

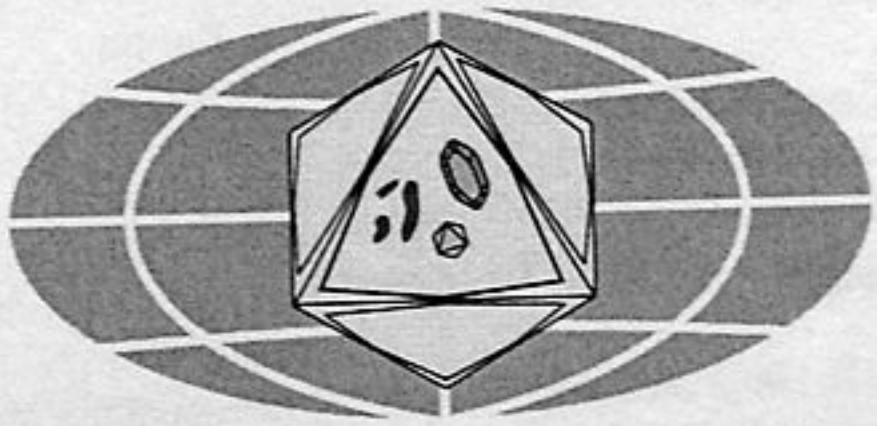
Supports: RFBR and SciTech Ministry grant 04-05-97220, RAS program on high-pressure research of The Earth and planets (2005).

РОССИЙСКАЯ АКАДЕМИЯ НАУК
СИБИРСКОЕ ОТДЕЛЕНИЕ
ИНСТИТУТ МИНЕРАЛОГИИ И ПЕТРОГРАФИИ

RUSSIAN ACADEMY OF SCIENCES
SIBERIAN BRANCH
INSTITUTE OF MINERALOGY AND PETROGRAPHY

ЭВОЛЮЦИЯ КОНТИНЕНТАЛЬНОЙ ЛИТОСФЕРЫ, ПРОИСХОЖДЕНИЕ АЛМАЗОВ И ИХ МЕСТОРОЖДЕНИЙ

Тезисы докладов Международного симпозиума,
посвященного 70-летию академика Н. В. Соболева
Новосибирск, 3–5 июня 2005 г.



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Abstracts of International Symposium
Dedicated to the 70th birthday of Academician N. V. Sobolev
Novosibirsk, June 3–5, 2005

Новосибирск
Издательство СО РАН
Филиал "Гео"
2005