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Presentation Time: 1:30 PM-5:30 PM

MICRODIAMONDS FROM ULTRA-HIGH PRESSURE TERRANES: FROM DISCOVERY TO SYNTHESIS IN A LABORATORY

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The discoveries of microdiamond within collisional orogeneic belts of Kazakhstan, China, Norway, Germany, Indonesia, Greece, and Russia are the foci in understanding deep subduction zones 'marked' by explosive volcanic activity, earthquakes and fast geomorphological evolution. The critical role of fluids in subduction zones has been addressed since the early 1970s. Fluids promote mass transfer and energy release in both thermal and mechanical forms, perhaps controlling slab pull and buoyancy forces. Experimental data suggest that fluids at high pressures may dissolve a large amount of solid components (Kennedy et al., 1962; Nakamura & Kushiro, 1974), and conversely, melts dissolve large amounts of volatiles, leading to a poor distinction between fluid and melt phases (Boettcher and Wyllie,1996; Bureau & Keppler, 1999). Now microdiamonds from orogenic belts provide a unique opportunity to directly study fluid compositions occurring in a subduction zone at a depth of >120 km. It was observed that diamond-bearing multiphase pockets in garnets and zircons are frequently accompanied by hydrous phases. Molecular water and carbonate radicals are detected in Kokchetav diamonds by FTIR (De Corte et al.,1998), and nanometric inclusions of oxides of Si, Fe, Ti, Th, Cr, and cavities of former fluid phases were discovered in diamonds (Dobrzhinetskaya et al., 2000, 2003). On the basis of those observations two concepts were suggested for the explanation of the origin of such diamonds: (1) crystallization from a supercritical COH fluid; (2) crystallization from fluid-bearing alkaline-carbonate melt. Both concepts have been successfully confirmed by experimental synthesis of diamonds at high P & T (Akaishi et al., 2002, Dobrzhinetskaya et al., 2002, Pol'anov et al., 2001). Diamond crystallization from graphite in the presence of H2O at high P & T is the most realistic explanation of microdiamond formations within UHPM terranes because it is in agreement with observations on the natural rocks. Although concept #2 is also well verified by experiments, no rocks bearing direct evidence of a partial melt that occurred in the diamond stability field were found yet within diamondiferous formations. Additional research projects need to be focused on this problem.

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