

Ultrabasic-basic change over primary inclusions in lower-mantle diamonds: Mineralogical and experimental evidence for crucial role of stishovite paradox

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Melting relations of the lower-mantle magmatic system $\text{MgO} - \text{FeO} - \text{CaO} - \text{SiO}_2$ are characterized by peritectic reaction of bridgmanite $(\text{Mg,Fe})\text{SiO}_3$ and melt with formation of Fe-rich phases of periclase-wustite solid solutions $(\text{MgO}\cdot\text{FeO})_{\text{ss}}$ and stishovite SiO_2 . The reaction proceeds also in melts-solutions of lower-mantle diamond-parental system $\text{MgO} - \text{FeO} - \text{CaO} - \text{SiO}_2 - (\text{Mg-Fe-Ca-Na-carbonate}) - \text{C}$. Xenoliths of lower mantle rocks were never found among the deep mantle derived materials. Estimation of lower-mantle mineralogy as ferropericlase+ bridgmanite+ Ca-perovskite association is inferred from high-pressure subsolidus experiments with ultrabasic pyrolite composition (Akaogi, 2007). The paradoxical *in situ* paragenesis of stishovite and ferropericlase as primary inclusions in lower-mantle diamonds (Kaminsky, 2012) takes its explanation from the bridgmanite peritectic reaction (effect of “stishovite paradox”) (Litvin et al., 2014). Based on the data for inclusions, physico-chemical study on syngensis of diamonds and primary inclusions has experimentally revealed the ferropericlase-bridgmanite-Ca-perovskite-stishovite-magnesiowustite-(Mg-Fe-Ca-Na-carbonate)-carbon compositions of the lower-mantle diamond-forming system. (Litvin et al., 2016). The generalized diagram of diamond-forming media characterizes the variable compositions of growths melts for diamonds and paragenetic phases and their genetic relationships with lower mantle matter, and it is the reason for genetic classifying primary inclusions. Fractional ultrabasic-basic evolution and continuous paragenetic transition from ultrabasic bridgmanite-ferropericlase to basic stishovite-magnesiowustite assemblages in the of lower-mantle diamond-parental melts-solutions are providing by the physico-chemical mechanism of stishovite paradox.

References

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