

Evolution of the lower mantle magma and diamond-forming melts (experiment at 24-26 GPa)

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The lower-mantle rock-forming minerals ferropericlase, bridgmanite, Ca-perovskite, stishovite, and magnesiowustite belong to the system MgO-FeO-CaO-SiO₂. Experimental study at 24-26 GPa of melting relation of the system over its polythermal section (MgO)₄₉(FeO)₂₁(CaSiO₃)₃₀-(SiO₂)₄₉(FeO)₂₁(CaSiO₃)₃₀ has revealed the peritectic reaction of bridgmanite and melt with formation of stishovite and phases of periclase-wustite solid solutions (effect of "stishovite paradox"). The reaction controls the ultrabasic-basic evolution of the lower mantle magmas and sequential formation of ferropericlase-bridgmanite and stishovite-magnesiowustite rocks (under the regime of fractional crystallization)

Native rocks of the lower mantle are the main source of oxide and silicate components for formation of the diamond-forming oxide-silicate-carbonate-carbon system MgO-FeO-CaO-SiO₂-(MgCO₃-FeCO₃-CaCO₃-Na₂CO₃)-C, as evidenced by mineralogy of primary inclusions in the lower mantle diamonds. By experimental evidence (at 24-26 GPa) the effect of "stichovite paradox" is applicable to the ultrabasic-basic evolution of diamond-producing melts and formation of ferropericlase-bridgmanite and stishovite-magnesiowustite assemblages known as primary inclusions in the lower mantle derived diamonds.

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