# The specific features of Ca-mineralogy of inclusions in sublithospheric diamonds

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Inclusions in sublithospheric (superdeep) diamonds represent an unique samples showing chemical heteregeneity of deep levels of upper mantle, transition zone and lower mantle [1]. It may be due to subductuon of lithosphere, oceanic crust and carbon-bearing metasedimets and their interaction with primary mantle rocks [2].

The inclusions of $CaSiO_3$ are unexpectedly common in superdeep diamonds. Most of them have low amount of impurities. In some rare cases the associated retrograde phases of $Ca_2SiO_4$ (larnite) and $CaSi_2O_5$ (titanite) are observed. Combined inclusions of $CaSiO_3$ and $CaTiO_3$ phases have also been formed in result of retrograde decopmposition of primary perovskite-structured $Ca(Ti,Si)O_3$ phase.

Reconstructed composition of the inclusions of Ca-bearing majoritic garnets suggest their formation at depths 300-500 km. Most of these garnets belong to metabasic assemblage. The variations of major and trace elements of majoritic garnets reflects either different compositions of their protoliths or re-enrichment during interaction with metasomatic agents.

The reports of such inclusions as mervinite and CAS in superdeep diamonds are suggested to indicate intaeraction of ultrabasic or basic mantle substrates with carbonatitic melts. It is additionally testified by the presence of carbonates as primary inclusions in superdeep diamonds.

The wide range of carbon isotopic composition ($\delta^{13}C$ -25 to +2.7 ‰) which has been observed in superdeep diamonds with inclusions of $CaSiO_3$ and Ca-majoritic garnets [3]. This range significantly expands the fields of mantle reservoirs involved in deep carbon cicle and diamond formation.

[1] Harte (2010) *Miner. Mag.* **74**, 189-215. [2] Walter et al. (2011) *Science* **334**, 44-47. [3] Zedgenizov et al. (2014) *Chem. Geol.* **363**, 114-124.