

A primary and secondarily-modified microstructure of kelyphites in garnet pyroxenites from the Ronda peridotite, Spain

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Kelyphite as a breakdown product of garnet may contain in its internal microstructure thermal and recrystallization history that rocks had followed because of its relatively high reactivities coming from its fine-grained nature. I re-investigated a once-well studied and published complexly-zoned kelyphite in a garnet pyroxenite layer in the Ronda peridotite, Spain (Obata, 1994). The zoning has been reported to consist of Zone I (Opx+Pl+Sp) adjacent to garnet, Zone II (Ol+Pl+Sp) and Zone III (Ol+Pl) adjacent to primary aluminous Cpx (Obata, 1994). A steady state-reaction and diffusion model has been proposed to account for a simultaneous generation of such zoned structure by a reaction between garnet and primary Cpx (Obata, 1994) in the plagioclase-lherzolite facies condition. However more simple structured kelyphite that consists of Opx+Pl+Sp+Cpx occurs in other pyroxenite layers from the same body. An important finding in sample R127 is the occurrence of trace amount of Cpx in both Zones I and II, thereby casting a doubt to the modeling that assumed a single-stage metasomatic reaction in the plagioclase-lherzolite facies as proposed in Obata (1994). Through more careful comparative studies of these samples, the author came to a conclusion that the simple structured kelyphite is a primary one and the complex zoning that Obata described is a secondarily modified one through later fluid-aided metasomatic reactions. The zone II and III are reaction products developed between a reactant pair of Zone I and the primary Cpx. From the presence of a small amount of Cpx in Zone I, It is concluded that first kelyphitization forming Zone I took place in the seilad subfacies of the spinel-lherzolite facies (OHara, 1967) and that late modification producing Zone II and III took place in the plagioclase-lherzolite facies. It is considered from the fact that these reactions are metasomatic, some metamorphic fluids acted as agents of the reactions. Kelyphitization of garnet occurred also in the host garnet peridotites. It is therefore possible to explore the fluid activities through comparative studies of kelyphitization between different lithofacies with close spatial associations.

Keywords: kelyphite, garnet, reaction zone, fluid, Ronda peridotite