American Mineralogist, Volume 93, pages 1061–1065, 2008

Arsenide in a metasomatized peridotite xenolith as a constraint on arsenic behavior in the mantle wedge

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ABSTRACT

An arsenide (low-Ni, high-Co löllingite) was found in a peridotite xenolith, which is strongly metasomatized by slab-derived melt or fluid from Avacha volcano, located in the Kamchatka arc. This is the first finding of a mantle arsenide within a fresh peridotite xenolith that may have been precipitated from metasomatic fluid/melt ultimately derived from the subducting slab. The löllingite is very low in Ni, suggesting low Ni-Fe partitioning between arsenide and olivine at mantle conditions. This is in contrast to sulfide, which favors Ni over Fe. An As-bearing fluid/melt thus plays some role in the metasomatic Fe enrichment in the mantle wedge. Supply of As is one of the characteristics of the upper mantle beneath the volcanic front.

Keywords: Arsenide, löllingite, mantle wedge, peridotite xenolith, Avacha volcano, Kamchatka arc