

2D and 3D textures of orthopyroxene oikocrysts and globular sulfides from the Shitoukengde Ni-Cu sulfide deposit, East Kunlun Orogenic Belt, NW China

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Orthopyroxene oikocrysts and globular sulfides are observed in the Shitoukengde Ni-Cu sulfide deposit within the Eastern Kunlun Orogenic Belt, China.

The abundance of orthopyroxene oikocrysts in the lherzolite gradually increases toward the contact with coarse-grained orthopyroxenite. Both the orthopyroxene oikocrysts in the lherzolite and the cumulus orthopyroxene in the coarse-grained orthopyroxenite are centimeter-sized and contain corroded olivine chadacrysts, exhibiting similar Cr-Al sector and oscillatory zoning, as revealed by EMPA mapping. This suggests that orthopyroxene oikocrysts formed rapidly in a dynamic, fluctuating magmatic environment rather than in a static crystal mush. We propose that orthopyroxene oikocrysts initially formed within a boundary layer between an olivine orthocumulate and an orthopyroxene-saturated magma before being entrained in flowing magma and redeposited in their current location.

Globular sulfides in the coarse-grained orthopyroxenite can reach sizes of up to one centimeter and lack associated silicate caps. Particle size distribution plots of the globular sulfides, based on Micro-CT analysis, exhibit concave-up curves, indicating that larger sulfide droplets formed through the coalescence of microdroplets. During postcumulus processes, the downward migration and coalescence of microdroplets within the interstitial orthopyroxene cumulate framework led to the formation of larger sulfide blebs. These coalesced sulfide blebs were trapped in the pore spaces of the crystal mush due to capillary effects, resulting in centimeter-sized globular sulfides. The morphology of coalesced sulfide droplets within the orthopyroxene cumulate is influenced by the relative sizes of sulfide blebs, pore bodies, and pore throats within the interstitial framework.