

## **Origin of Ni-rich olivines and its implications for the genesis of the Huangshannan Ni-Cu sulfide deposit, Northwestern China**

**YUN ZHAO<sup>1</sup>, CHUNJI XUE<sup>2\*</sup>, XIAOBO ZHAO<sup>3</sup>**

<sup>1</sup>yunzhao@cugb.edu.cn

<sup>2</sup>chunji.xue@cugb.edu.cn

<sup>3</sup>xiaobozhao@cugb.edu.cn

The Huangshannan Ni-Cu sulfide deposit at the southern margin of the Central Asian Orogenic Belt is an important recent discovery in the Eastern Tianshan region, Northwestern China. Olivine is the dominant mineral in the Huangshannan intrusion, occurring as olivine inclusions hosted by pyroxene oikocrysts, as olivine crystals in magmatic sulfides, and as poikilitic crystals in the lherzolite. The Ni abundance ranges from 1540 to 3772 ppm in poikilitic olivine grains, from 2114 to 3740 ppm in olivine grains hosted by sulfide minerals, and from 2043 to 4023 ppm in olivine inclusions hosted by pyroxene oikocrysts. For the three types of olivine, the ranges in forsterite (Fo) content are 78.97-84.92 mol%, 81.57-84.79 mol%, and 80.33-84.68 mol%, respectively. The Ni content of olivine is much higher than the range found in most within plate mafic-ultramafic rocks. The composition of olivine is controlled mainly by that of the parental magma, fractional crystallization and reactions with interstitial silicate and sulfide melts. Both fractional crystallization and reaction with interstitial silicate may cause a decrease in the Ni content of olivine. The possibility that Ni-Fe exchange causes the high Ni contents in olivine can be excluded because the olivine grains contained in sulfide have similar or lower Ni content than the olivine grains hosted in the silicate rock. The symmetric and reproducible variations in both Fo and Ni contents from core to margin in most of the olivine grains may reflect the equilibration of the olivine with new fluxes of magma. Similarly, the Huangshannan deposit may be produced by upgrading and scavenging of metals from multiple magmas by previously formed sulfide melts.