SU Benxun, ZHOU Meifu, XIAO Yan, ZHU Bin, SHI Rendeng and HE Yongsheng, 2015. Constraints of Fe Isotopic Compositions on the Origin of the Luobusa Podiform Chromite Deposit, Tibet. *Acta Geologica Sinica* (English Edition), 89(supp. 2): 89.

Constraints of Fe Isotopic Compositions on the Origin of the Luobusa Podiform Chromite Deposit, Tibet

SU Benxun[1,*], ZHOU Meifu[1], XIAO Yan[2], ZHU Bin[2], SHI Rendeng[3], HE Yongsheng[4]

1 *Department of Earth Sciences, the University of Hong Kong, Pokfulam Road, Hong Kong, China*
2 *State Key Laboratory of Lithospheric Evolution, Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing 100037, China*
3 *Key Laboratory of Continental Collision and Plateau Uplift, Institute of Tibet Plateau Research, Chinese Academy of Sciences, Beijing 100101, China*
4 *State Key Laboratory of Geological Processes and Mineral Resources, China University of Geosciences, Beijing 100083, China*

We measured Fe isotopic compositions of mineral separates of harzburgite, dunite and chromitite from Luobusa, Tibet as well as two harzburgites from Zedang for comparison to constrain the origin of podiform chromite deposits. The olivine (Ol) and orthopyroxene (Opx) of harzburgites from both localities have $\delta^{56}Fe$ values of 0~0.083‰ and -0.034‰~+0.081‰, respectively, within normal mantle range. Olivine in the Zedang harzburgites has lower $\delta^{56}Fe$ values than Opx, whereas the Ol in the Luobusa harzburgites is more enriched in heavy Fe than Opx. The contrasting sequence is probably related with significant peridotite-melt interaction in the Luobusa ophiolite compared to the Zedang ophiolite, which is further evidenced by their petrological and major elemental features. From harzburgite through dunite to chromitite (except one disseminated chromitite sample), $\delta^{56}Fe$ value of the Ol displays increasing trend up to 0.215‰ and positive correlation with their Fo contents and Cr# of associated chromite, suggesting that the interacting melts were isotopically heavier than the mantle peridotite. The extremely low $\delta^{56}Fe$ of the Ol in the disseminated chromitite may reflect fluid-related modification.

The chromite has variable Fe isotopic composition in different types of chromitites. The disseminated chromitite has the lightest Fe isotopes ($\delta^{56}Fe$=-0.247‰); the massive chromite contains the heaviest Fe isotopes ($\delta^{56}Fe$=0.043‰); and the nodular and banded chromite has moderate $\delta^{56}Fe$ values of -0.156~-0.079‰. The $\delta^{56}Fe$ values in chromite are positively correlated with their Mg# and Fe^{3+}/total Fe ratio. The Fe isotopic variations of the chromite suggest that the melts from which chromite crystallized were highly oxidized and their contribution became greater from nodular to massive ores. Some studies have well documented that mantle wedge is more oxidized than middle oceanic ridge (Evans et al., 2012) and that dehydration of subducting slab could result in light Fe-enriched fluids and heavy Fe-enriched residuals (Nebel et al., 2013). We thus propose that the formation of disseminated chromitite is possibly linked with released fluids from subducting slab and that nodular, banded and massive chromitites are most likely formed via interaction between oceanic mantle peridotite and melting of dehydrated slab coupled with asthenospheric upwelling.

References

Evans, K.A., Elburg, M.A., Kamenetsky, V.S., 2012. Geology 40, 783-786.
Nebel, O., Arculus, R.J., Sossi, P.A., et al., 2013. Geophysical Research Letters 40, 1-5.

* Corresponding author. E-mail: subenxun@mail.igcas.ac.cn