

Zn isotope fractionation during crustal melting: implication for Zn isotope variation in the crust

LI-JUAN XU^{1,*} SHENG-AO LIU^{2,*} SHUI-JIONG WANG³

^{1,2} State Key Laboratory of Geological Processes and Mineral Resources, School of Earth Sciences and Mineral Resources, China University of Geosciences, Beijing 100083, China
lxulj@cugb.edu.cn and 2lsa@cugb.edu.cn

³ Department of Geology Sciences, Indiana University Bloomington, IN 47405 USA,
sxw057@gmail.com

Zinc (Zn) isotope fractionation during continental crustal partial melting are investigated by measuring leucosome and melanosome of the migmatite from the Dabie orogen, Central China. The leucosome have been previously classified into three groups: silicic granitic melt (Group I), melt+plagioclase accumulations (Group II) and melt+ peritectic amphiboles (Group III). The $\delta^{66}\text{Zn}$ values (2se, 95% ci.) range from 0.42 ± 0.07 to $0.81\pm 0.05\text{‰}$, from 0.40 ± 0.05 to $0.42\pm 0.06\text{‰}$ and from 0.28 ± 0.05 to $0.56\pm 0.05\text{‰}$ for Group I, II, and III, respectively. The melanosomes yield $\delta^{66}\text{Zn}$ values from $-0.03\pm 0.05\text{‰}$ to $0.31\pm 0.08\text{‰}$. All of the leucosomes have heavier $\delta^{66}\text{Zn}$ values than the melanosomes.

The Y/Ho and Zr/Hf ratios for most of the leucosome and melanosome are in the chondritic ratio range except two samples from Group III, which suggest that the fluid exsolution may not be the control reason for the Zn fractionation of the leucosome and melanosome. Without obvious relationship for the Ba/Nb- $\delta^{66}\text{Zn}$ (‰) suggest that the external fluid could not the main reason for the Zn isotope fractionation. However, the $\delta^{66}\text{Zn}$ (‰) values of the leucosome show positive relationship with Ba concentration. In addition, the $\delta^{66}\text{Zn}$ (‰) values of the leucosome and melanosome show positive relationship with the (K+Na)/Al and $\delta^{56}\text{Fe}$ (‰) suggest that partial melting process may be one reason for the large Zn isotope fractionation.