Goldschmidt 2023 Abstract
https://doi.org/10.7185/gold2023.14250

The Sulfur isotopic composition of bulk Earth and implications

CHUN-HUI LI

Chengdu University of Technology

Presenting Author: lichunhui@cdut.edu.cn

Volatiles are of fundamental importance when considering almost all unique features of Earth. In the perspective of sulfur, there were two contrasting suggestions on its origin in the terrestrial mantle. The relative abundances of S, Se and Te in the mantle peridotites proposed the late veneer, whereas the stable S isotopic composition of the most depleted mid-ocean ridge basalts preferred the core formation. I will present our new work, Wang et al. (2021, Nature Geoscience), to introduce: (1) new sulfur isotope fractionation factors between metal and silicate melts at terrestrial core formation conditions calculated using first-principles molecular dynamics. (2) new founding that core formation does not fractionate sulfur isotopes, and therefore we can use the sulfur isotope composition of bulk silicate Earth to present the whole Earth. This certainly applies to other terrestrial planets and may be also applied to other stable isotope systematics. (3) new proposal that the whole Earth has a sub-chondritic sulfur isotope composition ($\delta^{34}S$ = -1.5 ‰), which is best explained by interactions between molten planetesimals and solar nebula, whereas the sulfur isotope composition of Moon ($\delta^{34}S$ = ~0.6 ‰) is consistent with the Moon-forming Giant Impact model.

Ref:

Wenzhong Wang, Chun-Hui Li, John P. Brodholt, Shichun Huang, Michael J. Walter, Min Li, Zhongqing Wu, Fang Huang & Shui-Jiong Wang. Sulfur isotopic signature of Earth established by planetesimal volatile evaporation. Nature Geoscience 14, 806–811 (2021). https://doi.org/10.1038/s41561-021-00838-6