Assessing the interference effects on Cd isotope analyses for soils and rocks with double spike correction by MC-ICP-MS

HUI-MIN YU[1,2], MENGSHU LIU[1], FAGN HUANG[1,2]

[1]CAS Key Laboratory of Crust-Mantle Materials and Environments, School of Earth and Space Sciences, University of Science and Technology of China, Anhui, 230026, China (huy16@ustc.edu.cn)

[2]CAS Center for Excellence in Comparative Planetology, University of Science and Technology of China, Hefei, Anhui 230026, China

Cadmium have 8 stable isotopes: ^{106}Cd, ^{108}Cd, ^{110}Cd, ^{111}Cd, ^{112}Cd, ^{113}Cd, ^{114}Cd and ^{116}Cd. It is important to assess the effects of isobaric interferences and molecules on Cd isotope measurement. We present a high precision Cd isotope measurement method using MC-ICP-MS with double spike correction. The effects of molecular interferences (*e.g.,* $^{109}Ag^{1}H^{+}$, $^{94}Zr^{16}O^{+}$, $^{94}Mo^{16}O^{+}$, and $^{70}Zn^{40}Ar^{+}$) and isobaric interferences (*e.g.,* Pd, In and Sn) to Cd isotope analyses were quantitatively evaluated. When the measuring solution has Zn/Cd ≥ 0.04, Mo/Cd ≥ 1, Zr/Cd ≥ 0.002, Pd/Cd > 5×10^{-5} and In/Cd > 10^{-3}, the measured Cd isotope data could be significantly affected by these interferences. The effect of Sn on the measured Cd isotope values can be corrected using exponential law even when Sn/Cd is up to 0.5. The long-term external precision of pure Cd solutions (BAM I012 Cd, Münster Cd and AAS Cd) was better than ± 0.05‰ (2 SD) for $\delta^{114/110}Cd$.

Moreover, the Cd isotopes of six soil reference materials from NIST (SRM 2709, 2709a, 2710, 2710a, 2711 and 2711a) and four rock reference materials from United States Geological Survey (USGS) (BCR-2, AGV-2, GSP-2 and COQ-1) were analysed. The $\delta^{114/110}Cd$ values of soil standards relative to NIST SRM 3108 were in the range -0.251 to 0.632‰, and the $\delta^{114/110}Cd$ values of rock standards varied from -0.196‰ to 0.101‰. The large variation of Cd isotopes in soils and igneous rocks indicates that Cd isotopes can be more widely used to study magmatic and supergene processes.