

An epidote standard for *in situ* LA-MC-ICP-MS Sr isotope

J.-Y. CHEN^{1,2}, C. HUANG^{1*}, J.-H. YANG¹,
Y.-H. YANG¹, L.-W. XIE¹

¹ Institute of Geology and Geophysics, Chinese
Academy of Sciences, Beijing 100029, China

² College of Earth Sciences and Resources, Chang'an
University, Xi'an 710054, China

(*correspondence: huangchao@mail.iggcas.ac.cn)

Sr isotopic composition has been widely used to constrain petrogenesis and source of rocks and geological processes. Epidote widely occurs in most types of rocks in nature. As an accessory mineral, it records the complex geological processes, including magmatism, metamorphism or hydrothermal activities of its host rock. It typically contains high concentration in Sr, but has very low Rb content, which makes it suitable for in-situ micro-analysis of Sr isotope. Matrix effect is a major problem of the in-situ Sr isotope analysis by LA-MC-ICP-MS. Therefore, a natural epidote standard is fundamental for the accurate measurement of Sr isotope. Here we report an epidote sample, i.e., PSV (probably from Pakistan), as a potential standard for in-situ Sr isotope analysis.

Sr isotopic results of PSV solution obtained by TIMS and MC-ICP-MS yield an $^{87}\text{Sr}/^{86}\text{Sr}$ ratio of 0.707672 ± 10 ($n = 2$, 2SD) and 0.707657 ± 12 ($n = 2$, 2SD), which are consistent with each other within analytical uncertainties.

In-situ Sr isotopic analysis of PSV was performed on polished thin sections using a Neptune MC-ICP-MS equipped with an 193 nm laser at the Institute of Geology and Geophysics, Chinese Academy of Sciences (IGGCAS). During analysis, a spot size of 160 μm was applied with a repetition rate of 8 Hz, and the energy density was ~ 10 J/cm². The results give a weighted mean $^{87}\text{Sr}/^{86}\text{Sr}$ ratio of 0.70757 ± 2 ($n = 131$, 2SD), which is consistent with the $^{87}\text{Sr}/^{86}\text{Sr}$ ratio of 0.707672 ± 10 ($n=2$, 2SD) obtained by solution-based methods (TIMS) within uncertainties.

Our study demonstrates that the PSV epidote is fairly homogeneous in Sr isotopic ratios at 160 μm scales. Variations in Sr isotopic ratios by LA-MC-ICP-MS did not exceed experimental uncertainties. Therefore, the PSV epidote is a potential standard for in-situ Sr isotope analysis.