

Optimization of LA–ICP–MS/MS Rb–Sr Dating of Micas with Non-Matrix-Matched Reference Materials - *IAG*

Early Career Researcher Award Lecture

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The recent development of LA-ICP-MS/MS techniques enables in situ Rb–Sr dating of micas, but there is not a matrix-matched RM yet. In this contribution, we optimize the laser conditions and develop a new data reduction approach for Rb–Sr dating of micas with non-matrix-matched RMs of Mica-Mg-NP and NIST SRM 612. This is achieved by systematically investigating the effects of laser ablation settings, data reduction methods, and the selection of the RMs on the Rb–Sr dating quality of a 306 ± 1 Ma hydrothermal muscovite [1]. We then tested this approach using 12 mica samples with known ages from 306 to 1.4 Ma. The results show that this technique can achieve accuracy of 2.5% or better and precision of ~1-3% for micas > 15 Ma [2]. The dating accuracy (> 9%) and precision (> 21%) decrease for micas younger than 5 Ma due to the short radiogenic accumulation time. This technique provides a way to date many types of mineral deposits and rocks, with a relatively high spatial resolution (down to 38 microns), fast turnaround time, and a higher closure temperature for muscovite than the Ar–Ar system, which makes it a powerful tool in geochronological studies.

[1] Cheng, Y., Spandler, C., Chang, Z., and Clarke, G., 2018, Volcanic-plutonic connections and metal fertility of highly evolved magma systems: a case study from the Herberton Sn-WMo Mineral Field, Queensland, Australia: *Earth and Planetary Science Letters*, v. 486, p. 84-93

[2] Huang, S., Chang, Z., Liu, K., and Garbe-Schonbert, D., 2023, Optimization of LA-ICP-MS/MS Rb-Sr dating of micas with non-matrix matched reference materials: *Geostandards and Geoanalytical Research*, v.47, p. 725-747.