

Development of reference materials for in-situ Rb-Sr isotopic dating by laser ablation ICP-MS/MS and its application to W-Sn deposits in the French Massif Central

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Rb-Sr dating techniques have been widely used as a geochronological tool to date and constrain the cooling history of geological events. However, in-situ dating using the ⁸⁷Rb-⁸⁷Sr beta decay system is severely limited by the isobaric overlap of ⁸⁷Rb on ⁸⁷Sr. Recent developments in in-situ Rb-Sr isotopic techniques by laser ablation inductively coupled plasma mass spectrometry equipped with a collision/reaction cell (LA-ICP-MS/MS) can resolve this problem, if appropriate reaction cell gases are used (O₂, N₂O and SF₆) [1, 2, 3]. In-situ Rb-Sr dating of minerals by LA-ICP-MS/MS requires calibration with well-certified matrix-matched reference materials with precisely known Rb/Sr ratios and Sr isotopic compositions. However, such well-characterized reference materials for in-situ Rb-Sr dating, in particular Rb-rich minerals such as micas, are currently limited.

In this study, we first establish and characterize reference materials suitable for in-situ Rb-Sr geochronology of high-Rb minerals (i.e., micas and feldspars). Four CRPG geostandards, phlogopite Mica-Mg, biotite Mica-Fe, glauconite GL-O and potash feldspar FK-N, were selected as potential mineral standards based on their broad compositional range, covering the compositional variation of micas and feldspars from granitic rocks. We will present the measured ⁸⁷Sr/⁸⁶Sr and ⁸⁷Rb/⁸⁶Sr values of the standards obtained by the isotope dilution method using multi-collector inductively coupled plasma mass spectrometry (MC-ICPMS) and thermal ionization mass spectrometry (TIMS) for Rb and Sr isotope measurements, respectively. Our second goal is to examine the selected Rb-Sr standards using an Agilent 8900 ICP-MS/MS coupled with a LA system and to use them as reference materials for dating of unknown samples. Towards this goal, the in-situ Rb-Sr isochron ages of micas from W ± Sn deposits in the French Massif Central will be compared against their already known U-Pb ages [4].

Acknowledgments

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References

[1] Zack & Hogmalm (2016), *Chemical Geology* 437; [2] Hogmalm et al. (2017), *J. Anal. At. Spectrom.* 32; [3] Bolea-Fernandez et al. (2016), *J. Anal. At. Spectrom.* 31; [4] Harlaux et al. (2018b), *Miner Deposita* 53