Evaluation of matrix effects during laser ablation MC ICP-MS analysis of boron isotopes in tourmaline

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This study evaluates the effects of laser ablation ICP-MS instrument parameters and sample matrix composition on data accuracy and precision. Laser ablation MC ICP-MS was used to determine boron isotopic compositions of several natural tourmaline group minerals with variable chemical composition. Some of the studied samples have been previously used as reference materials for *in situ* isotopic analysis (98144 elbaite [1, 2], 108796 dravite [1, 2], 112566 schorl [1, 2] and B4 [3]). The choice of laser and ICP-MS instrument parameters has a significant effect on the measured $^{11}B/^{10}B$ ratios, namely as a result of different signal intensities and $^{40}Ar^{4+}$ spectral interferes on the ^{10}B mass peak. This interference can be suppressed by optimizing mass resolution of the instrument. Laser induced isotopic fractionation of B was negligible for single laser spot and laser raster sampling strategies, allowing for a choice of an optimal sampling mode depending on the size, shape and homogeneity of the sample. It can be demonstrated that the tourmaline matrix affects significantly the obtained $\delta^{11}B$ values and impacts on data accuracy, especially if a non matrix-matched reference material is used for calibration. In case of matrix-matched calibration, the accuracy of LA MC ICP-MS boron isotopic data is comparable to the previously published values obtained by TIMS technique. The measurement precisions associated with the average $\delta^{11}B$ values achieved by LA MC ICP-MS are between 0.2 and 0.5‰ (1 s).

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Re-Os age of molybdenite from the Tatra Mountains, Poland

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The Tatra Mountains are a tectonically uplifted piece of Variscan crust emplaced during the Alpine orogeny and forming part of the Central Western Carpathians. Mesozoic sedimentary formations overlie a pre-Alpine core composed of a polygenetic granitoid intrusion and its metamorphic envelope, extensively migmatized [1]. The contact zone of metamorphic rocks and hybrid granite [2] is well exposed in the western part, called Western Tatra Mts.Textural, geochemical, and isotopic studies point to a mixed I- and S-type character for the Tatra granitoid intrusion, formed by multiple magma batches in the age interval 370–345 Ma [2, 3, 5]. The polygenetic granitoid intrusion, defined as a tongue-shaped, tabular body [4], is concordant with regional metamorphic foliation.

Molybdenite was collected from the northern debris slope (*ca.* 1580 m a. s. l.) below the Wołowiec peak. Molybdenite is observed as single isolated blades (<3 mm) or small aggregates of crystals (<5 mm in diameter) in pegmatite, within a coarse-grained leucocratic porphyritic granite. Molybdenite is associated with K-feldspar, albite, quartz and coarse-grained muscovite. In this area the local brecciation of the granite and its envelope by boron-rich fluid is observed.

The analyzed molybdenite sample has a Re concentration of 16.58 ± 0.01 ppm, and an ^{187}Os concentration of 61.04 ± 5 ppb, providing a ^{187}Re-^{187}Os model age of 350 ± 1 Ma indicating a period of molybdenite crystallization in Carboniferous Lower Missisippian (Tournaisian) and is in accordance (within brackets) with WR Rb-Sr isotopic age of pegmatites and U-Pb dating of magmatic zircons [6]. We suggest molybdenite crystallized from fluids locally derived from the hosting coarse-grained leucocratic granite. This is the first report on the presence of molybdenite in the Tatra Mts. and its age can be interpreted as the timing of fluid exsolution from the cooling granite.

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