Lithium isotopes in micas: an isotopic tool for the classification of granitic pegmatites?

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Over the last few decades, acquisition techniques of light stable lithium isotopes have been increasingly developed and applied to investigate the lithium behavior during pegmatite consolidation **[1, 2]**. Particularly, δ^7Li signatures are mainly studied to trace the genetic filiation between granitic source and pegmatites **[3, 4]** and to inspect the impact of their host-rocks on these Li-signatures **[2]**. However, no study has been applied at pegmatite-field scale. In this study, we use lithium and its isotopes to investigate the fractionation process during pegmatite consolidation and to distinguish different pegmatite groups in the Monts d'Ambazac pegmatite field (France). The Monts d'Ambazac pegmatite field is located in the North-Western part of French Massif Central and yields respectively ages for beryl-columbite and lepidolite-petalite subtypes **[5]** of 324± 5Ma (U/Pb method on columbite-tantalite group minerals) and 309± 0.9 Ma (Ar/Ar method on lepidolite, **[6]**). These pegmatites were mainly exploited in the last century for ceramic production but many occurrences as lepidolite, petalite, beryl, colombite-tantlite groups and phosphate species are present. The present classification is mainly based on: mineralogical observations, and the description of internal structures which allow classifying this pegmatite field in the LCT-type **[7, 8]**. However, no classification is based on geochemical and/or stable isotopic data.

We collected samples from 9 pegmatites which present different internal structures, some having highly developed aplitic unites, and different differentiation degree (muscovite *vs.* lepidolite occurrence). Nevertheless, the same intermediate unit has been collected in each pegmatite to be able to compare their δ^7Li signatures. The δ^7Li signatures have been obtained for biotite, muscovite and lepidolite crystals after handpicking separation.

Measurements of lithium isotopes were performed at Isotope Geochemistry Unit of the BRGM using the double focusing Neptune MC-ICP-MS (ThermoFinnigan). After an initial chemical lithium- separation, lithium isotopic signatures δ^7Li have been measured from distinct pegmatite bodies and interpreted.

Our results provide a δ^7Li (‰) range of high quality applied to describe granitic pegmatites and to investigate Li behavior in silicate melts. Different pegmatite groups have been differentiated they are different from those obtained from mineralogical classification. Finally, the geochemical data set provides good keys to analyze the impact of fluxes elements as Be, B and F on the δ^7Li signatures interpretation.

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