



## **LA-ICP-MS to study the distribution of REE, U, Th, Hf, Y and Ti in baddeleyite from Palaeozoic carbonatite deposits of Vuriyarvi and Kovdor (Kola region)**

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ICP-mass spectrometry is a modern highly sensitive method of analysis that allows simultaneous determination of a large number of elements with low and ultra-low detection limits. The appearance of high-power lasers solved the problem of direct microelement analysis of solid-phase objects, including natural minerals, glasses, etc., with the locality of determining up to 10–20  $\mu\text{m}$  using ICP-MS with laser ablation of a material (LA-ICP-MS).

The LA-ICP-MS-method applied to different groups of minerals requires detailed development and the initial stage of analysis - evaporation of the sample and the formation of an aerosol of particles for a plasma torch while minimizing the effects of elementary sample fractionation. Laser evaporation of minerals was carried out on UP 266 MACRO (New Wave Research) YAG: Nd aluminum-yttrium garnet based laser, 266 nm radiation wavelength, combined with ELAN 9000 ICP-MS spectrometer (PerkinElmer). The laser ablation was made in argon atmosphere in a 35 and 70  $\mu\text{m}$  diameter spot or when scanning to line with a pulse repetition rate of 10 Hz and pulse energy of 14–15 J/cm<sup>2</sup>. The device was calibrated using the SRM NIST 612 standard, validation was carried out according to the SRM NIST 610 standard, with a concentration of REE Th, Hf, and Ti of about 40 and 400 ppm respectively [1].

Baddeleyite is a zirconium dioxide mineral that is less common than zircon but very important as a geochronometer for exploring mafic and alkaline rocks. Using electron spectroscopy (Hitachi S-430), the morphology of baddeleyite crystals was studied and the position of the local analysis was chosen. New data on the elemental composition of baddeleyite (REE, Hf, U, Th, Y, and Ti) from the Kovdor and Vuorijarvi deposits (380 Ma) were obtained. Kovdor – the second largest deposit of baddeleyite after Phalaborwa [2].

The baddeleyite from reference rocks of alkaline intrusions are characterized by medium concentrations of Th (0.30–1011), REE (14.4–1099), U (1.89–85.7), Y (3.65–538), Ti (35.4–593) ppm and Hf (0.09–1.8%) for the samples from Vuorijarvi and Th (0.26–4.4), REE (2.83–17.2), U (3.2–62), Y (2.37–24.8), Ti (12.4–55) ppm, Hf (0.10–1.15%) for the samples from Kovdor. Concentrations of the determined elements in addition to uranium in the Vuorijarvi higher concentrations in Kovdor.

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2. Reishmann T., Brüggmann G.E., Jochum K.P. et al. (1995) // *Mineralogy and petrology.* V.53. P.155–164.