

## **Pyrochlore and baddeleyite from carbonatites of the Paleozoic polyphase Kovdor massif (N.Karelia)**

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Pyrochlore is the main host of rare-metal elements of carbonatite rocks, including phoscorites, typical for prolonged history of alkaline magma crystallization at the mafic-ultramafic polyphase Kovdor massif. Pyrochlore associated with baddeleyite, zircon, zirkelite, zirkonolite and forms octahedral and cube-octahedral poikilitic crystals up to 2-5 cm, and represented by U, Ba-Sr and REE species of pyrochlore subgroup. The studied Kovdor pyrochlores are characterized by increased up to 6.5% U and an extremely high Th – up to 40%, with Th/U up to 500. Pyrochlore U-Pb SHRIMP ages of 290-364 Ma correlate with variations in U of different samples, whereas the Th and common Pb have a minor effect on this value. Obtained ages are significantly underestimated and may reflect the influence of the matrix effect or later low-temperature closing of the U-Pb pyrochlore system, as well as the actual transformations of pyrochlore crystal matrix due to the interaction with the late carbonate fluids. Thus the early pyrochlores and U-pyrochlores crystallized at 364 Ma within phoscorites and early calcite carbonatites, whereas Sr-Ba pyrochlores of late calcite-dolomite carbonatite formed at 340 Ma, and Th-pyrochlore rims occurred at the later stages of the interaction with metasomatizing fluids 290 m.y. ago.

Kovdor baddeleyite is also characterized by high composition heterogeneity determined by the difference in its origin from olivinites to ore-bearing phoscorites and postmagmatic syenites. But baddeleyite from calcite-magnetite mineral association have uniform U:  $184 \pm 40$ , Th:  $6.4 \pm 1.7$ ,  $\Sigma\text{REE}$ :  $34 \pm 6$ , Hf:  $7629 \pm 599$ , Nb:  $3595 \pm 840$ , Ti:  $56 \pm 14$ , Y:  $22 \pm 4$  ppm, and  $\epsilon\text{Hf}$ :  $+6.5 \pm 1.7$  at the age of  $379 \pm 6$  Ma. The U-Pb SHRIMP age data demonstrate the concordance of all studied baddeleyite samples and the absence of a significant age difference between baddeleyites of the carbonatite phase:  $379 \pm 3$  and phoscorites:  $379 \pm 4$  Ma. The weighted average age for all the studied baddeleyite samples ( $n = 8$ ) is  $379 \pm 2.4$  Ma at MSWD of 0.6. This can also indicate a relatively short time-interval of magmatism in the formation of Kovdor polyphase massif which did not exceed 5 m.y. and could be related to the Devonian mantle-plume activity.