

REE minerals from the Ełk alkaline intrusion (East European Platform, NE Poland)

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The Carboniferous alkaline intrusions such as the Tajno alkaline-carbonatite complex, the Ełk syenite massif, or the Pisz gabbro-syenite complex cut the Precambrian basement of East European Platform. The massifs are covered by Mesozoic and Cenozoic sediments (600-800 m) and their borders were defined by extensive geophysical investigations as well as core drillings.

The alkaline rocks from the Ełk IG4 borehole (the Ełk syenite massif) were investigated as a potential sources for rare earth elements. The main aims of our study are to precisely identify the perspective drill-core intervals within the Ełk IG4 borehole materials as well as REE-bearing mineral paragenesis.

Detailed and precise “in situ” chemical analyses of borehole materials were performed with use of handheld XRF DELTA 50 Premium spectrometer (4W Ta anode X-ray tube, 50 kV). The parameters of spectrometers were optimized for rare earth elements such as Y, La, Ce. Handheld XRF non-destructive analyses allowed the identification of mineralized trends and anomalies within the drill-core material at the ppm level. The analyses were performed for each meter of drill core. The graph of these elements content vs. depth of the samples from Ełk IG4 borehole exhibited high differentiation, the content of La was in the range between 17 and 3241ppm, and Ce was between 24 and 5025ppm.

The samples with higher content of REE elements were chosen for further detailed micro-analyses. The mineral chemistry was performed using the CAMECA SX 100 electron microprobe. The main REE-bearing minerals are monazite, xenotime, allanite, Nb-titanite, REE-apatites, REE-carbonates (bastnasite, parisite), minerals from fergusonite, aeschynite and perierite-chevkinite groups and also zircon and minerals from catapleiite group. The presence of lorenzenite, Mn-ilmenite, pyrochlore, pyroxene (aegirine), mica, feldspars, plagioclase and quartz were also detected.

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