Acta Mineralogica-Petrographica, Abstract Series 1, Szeged, 2003

MORPHOLOGY AND GEOCHEMISTRY OF ZIRCON FROM THE METAMORPHIC ROCKS OF THE WESTERN TATRA MTS. (S-POLAND)

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In the Polish part of the Western Tatra Mts. metamorphic complex, migmatites predominate forming the northern envelope of the Rohace granite. They are both heterophanic (mainly stromatitic) and homophanic (schliere-type) ones. The P-T evolution of the metamorphic complex shifted from the medium pressures (7.5–9 kbar) and temperatures in the range of 700–730°C (Ky + St stability field) to the stability of sillimanite (750–780°C) and than to andalusite (GAWĘDA *et al.*, 1999). Among the migmatites two generations were distinguished: the first generation was formed during differentiation in the Ky+St stability field and the second one due to the partial melting in the sillimanite stability field (BURDA & GAWĘDA, 1999).

Zircons, being accessory minerals in migmatites, have been affected by the metamorphic events, occurring in this area and they may be considered as good petrogenetic indicators of the rock evolution. To observe the zircon response for the partial melting of the host metasedimentary rocks, the zircon crystals from both leucosome and mesosome from the stromatitic migmatite were investigated.

The population of zircons from mesosome is dominated by the normal prismatic crystals, differing in colours (colourless, grayish, yellowish-grayish and abundant brown and dark grey crystals). The length of single crystals varies in the range of 20 to 60 μm and the aspect ratio (length : width) ranges from 1:1 to 2:1. The degree of crystal roundness changes in the large scale, but in general subhedral crystals predominate. The percentage of anhedral zircons with rounded edges and tops is difficult to determine because of the transitional stages from euhedral to anhedral forms. Euhedral zircons can be both short and prismatic and elongated ones. In the population of short, isometric crystals the rounded, subhedral to anhedral forms are more popular. Different forms of zircon corrosion are observed in the analysed grain population. Fine-grained zircon aggregates are abundant in mesosome but rare in leucosome. The morphology of zircons from mesosome is dominated by the {110} prism and {211} pyramid. The most common types are S_1, S_2, S_6, S_7, L_1, L_2, with a distinguished maximum at S_1.

In CL images of the mesosome zircons inner cores, surrounded by the outer magmatic rims are commonly observed. The outer rims represent the magmatic recrystallization event in the metamorphic complex. Many rounded zircons are completely diffuse in the CL images, with neither an old core nor the outer magmatic zoning observed.

Among the zircons from leucosome euhedral, transparent, light-coloured crystals predominate, with elongation 2:1 to 4:1. They are mostly S_1, S_2, S_{21}, S_{22} forms according to Pupin's classification (PUPIN, 1980). In the typological distribution two maxims can be observed, suggesting the occurrence of two generations of zircons.

CL investigations often revealed subtle oscillatory zoning, due to heterogeneous distribution of trace elements during the crystal growth (HOSKIN & BLACK, 2000). The intensity of CL signal shows no major variations. It is possible that the chemical environment during crystallization remained fairly stable. These zircons grew during a single magmatic event. Some zircons exhibit inner cores, which are relics from the protolith.

Chemical analyses of zircons from mesosome revealed that Zr/Hf ratio varies in a wide range: from 24 to 110,2. However, about 50% of the analysed zircons show the Zr/Hf ratio in the range of 24–39. There are no major changes in major element distribution in the zircon crystals.

References

BURDA, J. & GAWĘDA, A. (1999). Arch. Miner., LII/2: 163-194.

GAWĘDA, A., DEDITIUS, A. & PAWLIK, A. (1999). Miner. Pol., 30/2: 63-82.

HOSKIN, P. W. O. & BLACK, L. P. (2000). J. Metamorphic Geol., 18: 423-439.

PUPIN, J. P. (1980). Contr. Miner. Petr., 73: 207-220.