Geophysical Research Abstracts, Vol. 8, 04024, 2006
SRef-ID: 1607-7962/gra/EGU06-A-04024

Nb-Ta-Ti-W-Sn-oxide minerals – monitor of evolution of a peraluminous granite system, Podlesí, Czech Republic

K. Breiter (1), R. Škoda (2), P. Uher (3)

(1) Czech Geological Survey, Geologická 6, CZ-15200 Praha 5, Czech Republic, (2) Institute of Earth Sciences, Masaryk University, Kotlářská 2, CZ-61137 Brno, Czech Republic, (3) Institute of Geologyy, Komenský University, Bratislava, Slovakia (breiter@cgu.cz)

Chemical compositions of Nb-Ta-Ti-W and Sn minerals from granitic pegmatites are widely studied. Also compositions of these minerals from individual granite intrusions were published many times, but only few studies about evolution of Nb-Ta-Ti-W phases in fractionated granite suite were performed. The Podlesí granite system (Krušné Hory Mts., Czech Republic, Breiter et al. 2005) gives good opportunity for such study. The studied rocks comprise (a) albite–topaz–biotite granites of the main intrusive phase of the Nejdek–Eibenstock pluton (0.5–1.0 wt% F, 20-30 ppm Nb, 4-10 ppm Ta, 30-40 ppm Sn), (b) more fractionated albite–topaz–protolithionite granites (0.5–1.2 wt% F, 28-40 ppm Nb, 8-17 ppm Ta, 12-70 ppm Sn), (c) flat dykes of late, extremely fractionated albite–topaz–zinnwaldite granites (1.0–3.0 wt% F, 60-170 ppm Nb, 20-56 Ta, 30-110 ppm Sn).

About 400 quantitative electron-microprobe analyses of Nb, Ta, Ti, W and Sn-phases were conducted. Element abundances of W, Mo, P, Nb, Ta, Si, Zr, Th, U, Ti, Al, Sc, Bi, In, Y, Ca, Fe, Mn, Pb and F were determined using a CAMECA SX100 electron microprobe (Masaryk University Brno). The accelerating voltage and beam current were 15 kV and 20 or 40 nA, respectively, with beam diameters from 2 to 5 μm. Raw data were converted into concentrations using appropriate PAP matrix corrections. Some additional analyses were performed at CAMECA SX50 (GeoForschungsZentrum Potsdam) electron microprobe at similar conditions.

Rutile appears in two types. The Nb, Ta-poor rutile I is the only Nb, Ta-bearing phase in the biotite granite and in greisens. Nb reach max 0.1 apfu and Ta max 0.02 apfu (cal-

culated for 2 oxygen atoms) and both elements are well positively correlated. Rutile II in the protolithionite and zinnwaldite granites associate with columbite, cassiterite and wolframite. This rutile is patchy zoned with large differences in chemical compositions between individual domains. Nb and Ta reach up to 0.16 apfu and 0.15 apfu, respectively. In this case, Nb and Ta are negatively correlated and the total of Nb+Ta newer exceeded 0.2 apfu. All rutiles are generally poor in Sn (<0.03 apfu) and W (<0.01 apfu). Higher charges of Nb, Ta and W are balanced with Fe (up to 0.15 apfu), while Mn is negligible (<0.002 apfu)

Columbite is the major host of Nb and Ta in all textural varieties of the zinnwaldite granite. All analysed columbite grains seams to be primary magmatic. General evolutionary trend of columbite, relative enrichment of Ta and Mn instead of Nb and Fe, is only slightly expressed: Ta/(Nb+Ta) 0.05→0.55, Mn/(Fe+Mn) 0.1→0.4 (atomic ratio). During this evolution, Ti decreases from 0.4 to 0.05 apfu, but W increases from 0.05 to 1 apfu (in ixiolite, calculated for 6 oxygen atoms). Sharp decrease of Ti and increase of W were found also within individual columbite crystals growing in domains with unidirectional solidification textures.

Disseminated cassiterite I from the zinnwaldite granite seams to be magmatic. It is enriched in Nb and Ta up to 0.035 apfu Nb and 0.070 apfu Ta (calculated for 2 oxygen atoms). Both Nb and Ta enter the cassiterite lattice using columbite substitution 3 Sn ↔ (Fe, Mn) + 2 (Nb, Ta). Hydrothermal cassiterite II from greisens is enriched only in Fe (up to 0.05 apfu).

Disseminated wolframite I from different varieties of zinnwaldite granite contains up to 0.3 apfu Nb and 0.25 apfu Ta, while hydrothermal wolframite from greisens is Nb, Ta-poor.

Breiter K., Müller A., Leichmann J., Gabašová A. (2005): Textural and chemical evolution of a fractionated granitic sytem: the Podlesí stock, Czech Republic. Lithos 80, 323-345.