Composition of Biotites from Čierna Hora Granitoids (Western Carpathians) as an Indicator of the Granite Tectonic Setting

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Biotite – the dominant ferromagnesian mineral – has been analysed from Variscan granitoid rocks of the Čierna Hora Mts. (Western Carpathians) by an electron microprobe for completing of the existing data of their major elements and by Mössbauer spectroscopy for estimation of their Fe^{3+} vs. Fe^{2+} ratio. The direct relation between chemical composition of biotite and parental rock along with the presence of numerous minute inclusions of primary accessories trapped during biotite growth suggests the magmatic origin of biotite.

The analysed biotites exhibit a fairly wide range of X_{Fe} values and total Al content atoms per formula unit (apfu). Biotite from Ťahanovce area is characterised by high mean Al contents ~ 3.2 apfu and Fe/(Fe+Mg) values in the range 0.5 to 0.63. The positive correlation between Fe/(Fe+Mg) and Al_{tot} indicates the participation of sedimentary material on the granitoid petrogenesis. The trend of assimilation of aluminous crustal material to the magma is more significant in granites from Miklušovce complex because of higher mean Fe/(Fe+Mg) value (0.77) with more pronounced trend of increasing total Al (~ 0.8 apfu). On the other hand, biotites from Sokoľ and Sopotnica area show lower mean values of Al (approximately 2.97 apfu) and Fe/(Fe+Mg) ratio varies within 0.49 to 0.53 what indicate the I-type character of host rock. Concerning to the Fe valency, higher content Fe^{3+} (up to 20 wt. %) is characteristic for biotites from Sokoľ and Sopotnica granitoid bodies, whereas biotites from Ťahanovce granitoid massif show decrease Fe^{3+} content (around 5 wt. %). Such relation indicates the typical I-type oxidizing conditions due to the presence of higher water content during Sokoľ and Sopotnica granitoid evolution. Biotites from Ťahanovce area imply more reducing conditions with lower water content, and this is characteristic for the S-type granites.

According to the biotite chemistry we assume the affinity of granitoids from Sokoľ and Sopotnica massifs to the I-type granitoid suite which has been formed from slightly differentiated magma with mantle contribution. Contrary to it, Ťahanovce granitoid body and granitoids from Miklušovce complex show affinity to the S-type granitoid suite due to the precipitation of Fe-biotites from multiply contaminated melt by crustal material.

Granitic Rocks from Branisko Mts. (Western Carpathians): Geochemistry, Mineralogy and Tectonic Implications

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On the basis of textures, mineral composition and geochemical characteristics, the granitoid rocks of Branisko crystalline basement form two separate main groups: 1) syn-collision peraluminous leucocratic granites and granodiorites widely distributed in the S and W part of Branisko crystalline basement; 2) post-collision granodiorites inhabited mainly in the NE part of mention crystalline basement. Available mineralogical and geochemical data reveal that these two groups can be characterised by different magmatic evolution or protolith history.

The first group shows rather evolved geochemical characteristics. Major and trace element geochemistry of (leuco)granites clearly indicates their crustal origin. The main rock-forming minerals are K-feldspar + quartz + albite (An_{0-5}) + muscovite; essential accessory mineral phases are apatite, zircon (S_{1-3}; L_{1-3} types), monazite, xenotime, garnet ± rutile whereas REE contents (La_N/Yb_N ~ 19) are particularly controlled mainly by monazite. EMPA dating of monazite yielded age 342 ± 15 Ma for leucocratic granites (Bónová et al. 2005). Granodiorites which are occurred in western part of Branisko crystalline basement show slightly different features in comparison with granodiorites–tonalites from NE side. Higher volume of K-feldspars and significantly lower content of biotite or other mafic minerals is their dominant feature. Biotite exhibits a high total Al contents, reaching up to ~ 3.25 apfu. The biotite samples from investigated granodiorites define a relatively narrow range of Fe/(Fe+Mg) values, from 0.51 to 0.54 apfu and higher contents of TiO_2 (around 3.8 wt.%). Accessory minerals are zircon, apatite, rutile and monazite.

The granites of S and W parts of Branisko crystalline complex generally display affinity to S-type granites. In particular, we suggest that leucocratic granites have been formed by crys-