PRIMARY *VERSUS* METASOMATIC TOURMALINE FROM ELBAITE-SUBTYPE PEGMATITE IN PIKÁREC NEAR KŘIŽANOV, CZECH REPUBLIC

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High compositional variability of tourmaline in the individual textural-paragenetic units of granitic pegmatites makes tourmaline excellent and widely used indicator of geochemical evolution from magmatic to hydrothermal stage and of external contamination of pegmatite melt as well. However, discerning of primary tourmalines and metasomatic ones are ignored in most cases. The elbaite-subtype pegmatite Pikárec is located in the easternmost part of the Moldanubian region, western Moravia, Czech Republic. Symmetrically zoned dike, ~ 3 m thick, is enclosed in amphibolite and consists of thin (i) coarse-grained outer granitic unit (Plg + Kfs + Qtz + Bt), volumetrically dominant (ii) graphic unit (Kfs + Qtz > Ab + Qtz) evolving to (iii) albite unit with blocky K-feldspar (Ab + Kfs + Qtz) and locally with (iv) small pockets. Tourmaline is a typical minor mineral evolving from the assemblage annite + schorl in outer parts of graphic unit through black schorl-foitite to Mn-rich foitite rimmed by pink elbaite in the inner part of graphic unit (Fig. 1a,b). Crystals of red, pink and green Mn-rich elbaite-rossmanite occur in pockets. Rare to common accessory minerals include fluorapatite, löllingite, spessartine, beryl, cassiterite, columbite, microlite, muscovite, polylithionite and pollucite. Alteration of early tourmaline (+ feldspars) by metasomatic tourmaline (Fig. 1a,b) is a typical feature of most tourmaline grains and crystals except those from pockets.

The reaction rims are always developed on the contact with plagioclase, albite or K-feldspar; no changes were found on the contact with quartz (Fig. 1a; left upper part). They originated in part instead of early tourmaline and in part instead of surrounding feldspars. These replacement processes may be expressed by the simplified reactions: Fig. 1a – Mg-schorl → schorl – (1) Mg → Fe^{2+}; anorthite component in plagioclase → liddicoatite – (2) 7An + $2Li_2O$ + $3B_2O_3$ + H_2O → 2 liddicoatite + 5CaO + $2SiO_2$; Fig. 1b – Na-rich Mn-foitite → X-site vacant, F-enriched elbaite – (3) foitite + Na_2O + Li_2O + Al_2O_3 + F → elbaite + H_2O + 2FeO; elbaite → elbaite (slightly Ca,F-enriched). Stoichiometry of the reactions is quite complicated; hence, some reactions are only approximate. Nevertheless, the reactions evidently require fluids rich in Li_2O, B_2O_3, F, and H_2O, what we can expect in early subsolidus stage at such complex (Li) pegmatite. The plot on Fig. 1c shows enrichment of metasomatic tourmaline by F relative to its primary precursors. In addition, slight to strong enrichment in Ca of metasomatic tourmaline is typical. Consequently, slight to moderate Ca,F-enrichment in late tourmaline may be an indication of its metasomatic origin in complex granitic pegmatites.

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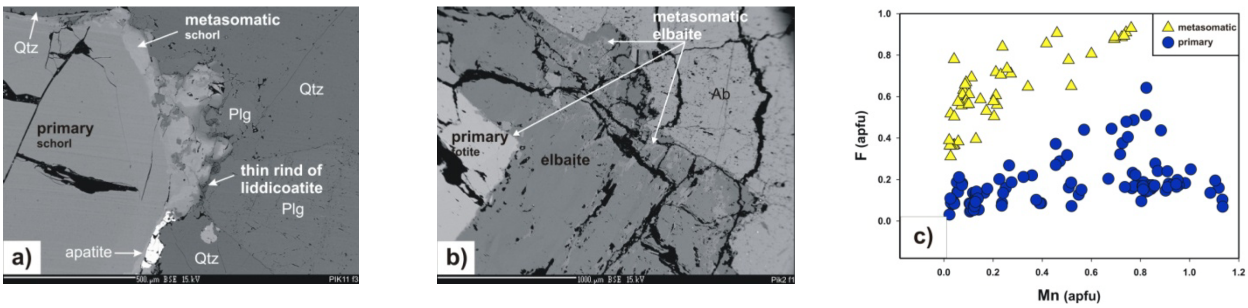

Fig. 1. *Textural relations (a, b) and F/Mn plot (c) of primary and metasomatic tourmalines. Replacement of early tourmaline + feldspars and surrounding feldspars by metasomatic tourmaline: a) outer part of graphic unit with plagioclase An_{15}; b) inner part of graphic unit with albite An_{01-00}.*