DISTRIBUTION OF REE IN TOURMALINE FROM TOURMALINITES AND HOST MICA SCHISTS: IMPLICATIONS FOR EVOLUTION AND GENESIS

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Tourmaline is the most common borosilicate occurring in a variety of rock types of highly varying compositions and geological settings. The large compositional range in both major and trace elements makes tourmaline an excellent indicator of the chemical and physical properties in its host environment (VAN HINSBERG *et al.,* 2011). Interpretation of the REE compositional record in tourmaline depends on availability of REE data for tourmaline of different genesis and REE partitioning between tourmaline, coexisting minerals, melts and fluids.

We analysed REE+Y contents in tourmaline from tourmalinites and host mica schists from the Svratka Unit, Bohemian Massif to use REE for genetic interpretations. Tourmalinites (Tu + Qtz + Ms ± Grt ± Bt ± Ky ± Sil) form stratiform layers (< 1 cm to up to 1 m) hosted in mica schists (Qtz + Ms + Bt ± Grt ± Tu ± Ky ± Sil ± St ± Pl). The tourmaline from tourmalinites usually exhibits three compositional domains, (i) brecciated chemically heterogeneous schorl core interpreted as an older, low-temperature hydrothermal tourmaline; (ii) dravite-rich tourmaline overgrowing schorl core crystallizing during the Variscan amphibolite-facies prograde metamorphic event; (iii) outermost Al-rich schorl-dravite rim, growing most likely during exhumation of the Svratka Unit accompanied by decreasing pressure and temperature (ČOPJAKOVÁ *et al.,* 2009). The tourmaline from the host mica schists corresponds to dravite-rich tourmaline rimed by schorl-dravite and show similar chemical composition and evolution as metamorphic tourmaline (ii+iii) from tourmalinites.

Total REE contents in tourmaline are rather low to medium 1–60 ppm. Systematic variations were observed in the absolute abundance of REE and in chondrite normalized REE-patterns in tourmaline from both rock types and different tourmaline zones. The highest ΣREE contents are in (i) schorl tourmaline cores and the lowest in (ii) metamorphic dravite from tourmalinites. The REE patterns in tourmaline from tourmalinites are relatively flat (La_N/Yb_N = 0.1–5), commonly with slight MREE enrichment (Sm-Gd) yielding none or weak positive Eu anomaly (Eu/Eu* = 1–3). The (i) schorl cores show systematically slightly higher La_N/Yb_N ratio compared with (ii+iii) metamorphic outer zones. Total REE contents in tourmaline from mica schists are 3–27 ppm, REE patterns are LREE enriched with steep La-Dy pattern (avg. La_N/Dy_N = 13) and significant positive Eu anomaly (avg. Eu/Eu* = 10) accompanied by increasing contents of HREE from Ho to Lu. The La_N/Yb_N ratio (1.8–23) is higher compared with tourmaline from tourmalinites. Tourmaline from mica schists shows rimward increase in REE. All tourmalines are Y-depleted with significant Y anomaly compared with Dy and Ho.

The REE patterns in tourmaline do not reflect whole rock (tourmalinite and mica schist) REE patterns. Eu-enriched chondrite-normalized REE patterns are rather a hydrothermal fluid signature of tourmaline. Metamorphic tourmaline (ii+iii) from tourmalinites and hosted mica schists show distinct REE-patterns, but rimward REE enrichment was observed in both rock types. This rimward increase of REE probably reflects tourmaline growth during decreasing PT conditions. The REE patterns for metamorphic tourmaline in tourmalinites (ii+iii) and mica schists indicate crystallization of tourmaline from metamorphic fluids, where REE were donated by wall rocks. The major REE source for (ii+iii) metamorphic tourmaline in tourmalinites was probably (i) schorl core. Relative enrichment in HREE and depletion in LREE in younger (ii+iii) tourmaline compared with (i) schorl core can relates to elevated contents of F^- in tourmalinite layers and, hence, stronger complexation of HREE by F-rich metamorphic fluids. The REE patterns in metamorphic tourmaline from mica schists agree with preferential fractionation of Eu and LREE into metamorphic fluids during metamorphic processes in pelitic rocks (JIANG *et al.,* 2004).

REE contents in garnets showing simple compositional zoning with rimward decreasing of REE+Y, increasing of Tb/Lu ratio and deepening of negative Eu anomaly confirm garnet growth during prograde metamorphism (BEA & MONTERO, 1999). No relation between presence of garnet and REE-distribution in metamorphic tourmaline from tourmalinites and mica schists was observed.

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