

Tourmaline geochemistry and B-isotopes from the Palokas Au-mineralization, Peräpohja Belt, Northern Finland

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In 2012, disseminated gold mineralization was discovered in the Rajapalot area, located in the northern part of the Paleoproterozoic Peräpohja Belt. This study presents microprobe and B isotope data from tourmaline collected from three different localities: the Rajapalot gold mineralization, ca. 1.78 Ga tourmaline granite and Petäjäsoski Formation with an inferred evaporitic origin. Based on textural evidence, tourmaline in the gold mineralization is divided into two different types. Type 1 is located within the host rock and is cut by rock-forming anthophyllite crystals. Type 2 occurs in late veins/breccia zones with the mineralogy consisting of ca. 80% of tourmaline and 20% of sulphides.

All the studied tourmalines belong to the alkali group tourmalines and can be classified as dravites and schorls. $\delta^{11}\text{B}$ values between the three localities are identical, ranging from +1 to -4‰. Tourmalines from the Au mineralization and from the Petäjäsoski Formation show similar compositional trends and dominant substitutions. No indications of substitution of Al by Fe^{3+} were observed, hence implying low $\text{Fe}^{3+}/\text{Fe}^{2+}$ values. Compositional data indicate that the tourmaline grains in the Rajapalot Au mineralization were precipitated from reducing low-salinity fluids. Similar chemical compositions and $\delta^{11}\text{B}$ values imply a common boron source for all the analyzed tourmalines. The late appearance of the tourmalines and preliminary Re-Os dating of molybdenite (Vanhanen et al., 2015) indicate at least the temporal association of tourmaline in the Rajapalot Au mineralization and ca. 1.78 Ga granites.

References:

Vanhanen E, Cook NDJ, Hudson MR, Dahlenborg L, Ranta JP, Havela T, Kinnunen J, Molnár F, Prave AR, Oliver NHS (2015) Rompas Prospect, Peräpohja Schist Belt, Northern Finland. In: Maier WD, O'Brien H, Lahtinen R (eds) Mineral Deposits of Finland, Elsevier, Amsterdam, p. 467–484.