Epidotes in different rock alterations in Elatsite PCD, Bulgaria

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In Elatsite porphyry copper deposit (PCD) a small porphyritic intrusion (Q-monzodiorite to Granodiorite), elongated in E-W direction, and many porphyritic dikes are intruded into the rocks of the Vezhen pluton and in the low-grade methamorphic rocks from the basemant, near the contact they are metamorphosed into hornfelses [1,2]. The hydrothermal rock alterations are: K-silicate alteration, K-silicate-sericitic, quartz-sericitic, quartz-adularia carbonatic and propylitic alterations [3]. Recently our study has confirmed the presence of skarn formation. Four different varieties of epidote are established in the deposit: Et-1 from propylitic alteration; Et-2 related with skarns formation; Et-3 occurs as clusters and Et-4 in veinlets with ore minerals.

Et-1 from propylitic alterations occurs as fine-grained yellow to colourless crystals replacing magmatic amphiboles and biotites. They are determine as epidote to clinozoisite. Et-1 has ∑REE = 965.58 (higher for Et-1 replacing magmatic biotite), with clear positive Eu anomaly (CI norm. patterns) and highest contents of Pb and Sr. Et-2 occurs in skarns with grossular, clinopyroxene, titanite. Et-2 has the highest values for Al and the lowest values for Fe, with ∑REE = 976.40 and slight positive Eu anomaly. Et-3 is observed mainly in clusters, nest and veinlets which crosscut the preexisting K-silicate, K-silicate-sericitic, quartz-sericitic and skarn alterations. It is present as yellow-green aggregates with amphibole, carbonate, small quantity of quartz and titanite. Et-3 has negative correlation between Al and Fe, with the lowest contents of Pb, U, Sr, Ba and ∑REE =14.26. Et-4 occurs in nests and veinlets with ore minerals (dominated by pyrite and/or chalcopyrite) and it is present as colorless to yellow-green aggregates. Et-4 has negative correlation between Al and Fe, with ∑REE = 239.21, slight negative to slight positive Eu anomaly and highest values for U and Ba.

The clear positive Eu anomaly in Et-1 may indicate the reduction of the oxygen fugacity during the propylitic alteration. While the negative correlation between Al and Fe in Et-2, Et-3, Et-4 may be an indicator for the high oxygen fugacity during their crystallization.

[1] Popov *et al.* (2000) *ABCD–Geode. Worksh. Bulg.*1-7; [2] Von Quadt *et al.* (2005) *Ore Geol. Rev.* **27**, 95-126; [3] Ivanov *et al.* (2014) *Bul. Shk..Gjeol. Sp. Iss. Alb.* 158-161;