

REE distribution in Fe-Ti-V deposits of the Suwalki Anorthosite Massif - an economic importance

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The Suwalki Anorthosite Massif (SAM) is located in NE part of Poland, within Mezoproterozoic, beltiform magmatic AMCG [Anorthosite-Mangerite-Charnockite-Granite rapakivi] suite known as a Mazury Complex.

These basement rocks of 1.5 mld y. old are covered by 900 m thick sedimentary cover. The SAM has an oval shape and occupies an area of 250 km². Its central part is built up of anorthosites surrounded by rings of norites, gabbro-norites, diorites and granites. [1] The SAM ore rocks (ferrolites) were previously a research object during the planned of the Suwalki Iron Mining Region in the 60s and 70s of the XX century. The Fe-Ti-V large ore deposits in Krzemianka and Udryn areas and two other smaller were established as mining prospective zones. The titanomagnetite, ilmenite and sulphides: pyrite, pyrrhotite, chalcopyrite are the main ore minerals. Fe-Cu-Co-Ni sulphides represent 1 to 4% of the rock volume [1,2]. Nano-concentrations of REE (La, Ce, Nd), PGE, Au and zircon minerals are present within sulphide dispersed mineralisation. Their size ranges from 10 to 150 µm or in some cases up to 450 µm. Sulphides are surrounded by nano-forms of REE (La, Ce and Nd) and PGE elements as mineral admixtures of 10-100 µm or even up to 300 µm. Numerous, small inclusions of Te-bearing minerals (0.4-0.7 mass %) were measured in secondary origin sulphides, especially in millerite. These admixtures are grouped in small inclusions, which are directed along hot solutions flow. The increased amounts of REE, PGE and Au-Ag inclusions are present in more than 40% of sulphides.

New results of REE and PGE distribution in main Fe-Cu-Co-Ni sulphides may increase an economic value of Fe-Ti-V documented deposits in SAM intrusion.

This research was funded by NCN project **2015/17/B/ST10/03540** and Warsaw University Foundation project **35/04/2017**

[1] Wiszniewska J., (2002). Biuletyn PIG. Nr 401.

[2] Wiszniewska J., Claesson S., Stein H., Vander Auwera J. and Duchesne J.C. (2002). Terra Nova, 14, 451–460.