

DESCRIPTION FOR THE GENERAL PUBLIC (IN ENGLISH)

The main objective of the proposed research project is study new and rare minerals containing vanadium and barium from pseudowollastonite paralava hosted in gehlenite hornfels of the Hatrurim Complex from selected localities in the Negev Desert and Judean Mts.

In 1977 Shulamit Gross described 5 minerals containing phosphate groups and one mineral with vanadate groups occurring in pyrometamorphic rocks of the Hatrurim Complex. In 2013 in paralavas of the Hatrurim Complex 3 new mineral species containing barium and/or vanadium were described: gurimit - $\text{Ba}_3(\text{VO}_4)_2$, zadovit - $\text{BaCa}_6[(\text{SiO}_4)(\text{PO}_4)](\text{PO}_4)_2\text{F}$ oraz aradyt - $\text{BaCa}_6[(\text{SiO}_4)(\text{PO}_4)](\text{VO}_4)_2\text{F}$.

Preliminary study of pseudowollastonite paralava mineralogy confirms an occurring of the next potentially vanadian and/or barium new and rare minerals or minerals bearing these elements: 1) potentially new V-Ba minerals of the apatite supergroup: fluorine analog of alforsite - $\text{Ba}_5(\text{PO}_4)_3\text{F}$, vanadian analog of fluorapatite- $\text{Ca}_5(\text{VO}_4)_3\text{F}$ and rare minerals of the apatite – ellestadite series containing vanadium; 2) minerals with palmierite structure: gurimite - $\text{Ba}_3(\text{VO}_4)_2$ and potentially new mineral, phosphorus analog of gurimite - $\text{Ba}_3(\text{PO}_4)_2$; 3) exotic garnet of the andradite-schorlomite series containing V^{5+} at tetrahedral site - $\text{Ca}_3(\text{Fe}^{3+}, \text{Ti})_2(\text{Fe}^{3+}, \text{Si}, \text{V}^{5+})_3\text{O}_{12}$.

The objective of this project is also an estimating of mechanism of enrichment of paralava fragments in incompatible elements (Ba, V, P, Ti, S, U etc.) and testing of possibility to use a mineral pair wollastonite/pseudowollastonite as a genetic temperature index.

The following research tasks will be realized in the frame of the project: field works; preparations of probes for different investigations with using of optical microscope and powder XRD; modern methods of investigations a solids, such as a scanning electron microscope with EDS and EBSD detectors, microprobe analyzer, single-crystal XRD, spectroscopic methods (micro-Raman and FTIR), TofSIMS and ICP MS.

Discovery and description of 1-3 new mineral species from pseudowollastonite paralavas will be the main effect of realization of the proposed project.

The discovery of a new mineral species is very prestigious and important achievements in the field of earth sciences. It is a contribution not only to the development of mineralogy and crystallography, and also to geology and other sciences such as chemistry, physics and materials science. Results of investigations concerning to new minerals get into different databases - from mineralogical and structural to technological databases. The discovery of mineral with unknown structure gives a chance for the creation of new advanced materials based on this structure, which may have a significant impact to development of new functional materials (lasers, optical detonators, semiconductors).