

DESCRIPTION FOR THE GENERAL PUBLIC

The project aims at a comprehensive mineralogical and geochemical characterization of pegmatites from Piława Górna, Góry Sowie Block, Lower Silesia, Poland. This pegmatitic system is unique because:

- It is the largest pegmatitic occurrence in Poland and the richest Polish accumulation of such rare elements as Li, Be, Rb and Cs.
- It represents the hybrid NYF+LCT (niobium–yttrium–fluorine + lithium–caesium–tantalum) petrogenetic family, the least investigated category of granitic pegmatites. With detailed characterisation of mineralization types as well as geochemical processes that controlled their evolution, the Piława Górna pegmatites may become a model example for this category of pegmatites.
- While other world occurrences of the hybrid NYF+LCT pegmatites represent bodies with rather narrow range of textural differentiation and geochemical fractionation, the Piława Górna pegmatitic system consist of dikes that practically encompass the entire range of degrees of geochemical evolution. That guarantees that the resulting description will be an exhaustive and comprehensive study.
- Perfect exposure in an active quarry provides an opportunity to assemble a large collection of samples representing all possible types and zones of the pegmatitic system. However, this type of exposure means also that without intensive scientific field works, most of the pegmatitic material may be processed as raw rock material and thus lost for science in a short time.
- It hosts very rich and exotic mineralization with about 100 mineral species identified so far, including very rare minerals as well as absolutely new mineral species.

Scientific activities planned within the frames of the proposed project include:

- Systematic field works, which will monitor new sections of the pegmatitic system uncovered during the routine mining activity in the quarry and secure the broadest possible spectrum of samples. Samples of the top-quality mineralization will enlarge the collection of pegmatitic minerals from the Góry Sowie Block deposited in the Mineralogical Museum of the University of Wrocław.
- Complex laboratory studies focused on mineral indicators of rare elements fractionation, mainly feldspars, micas, garnets, Be minerals, tourmalines, primary and secondary Nb-Ta phases, (Y+Ln)- and (U+Th)-bearing phases including monazite, xenotime, zircon and thorite, as well as Li- and Cs-bearing phases. These investigations will result in the determination of geochemical processes that controlled the evolution of the pegmatitic system. In particular they cover the evaluation of fractionation degrees of rare elements and definition their fractionation paths, reconstruction of crystallization sequences of different mineral assemblages, description of new mineral species (already detected as well as the expected ones) as well as should establish the extent of *in situ* contamination of the pegmatite-forming melt by the adjacent amphibolite. The research techniques include: whole-rock geochemical analyses, electron-microprobe spot chemical analyses, in situ microanalysis of trace elements and isotopes using ion microprobe or laser ablation LA-ICP-MS equipment, routine phase investigations, i.e. observations and imaging, using optical light, cathodoluminescence and electron microscopy, powder X-ray diffraction, infra-red and Raman spectroscopy, and single-crystal X-ray structure refinement in the case of new minerals' description. The studies will be partly carried out in home universities of the research team and partly in collaboration with foreign crystallographers and mineralogists dealing with structural studies of minerals.

The expected results would:

- add to understanding of the origin and processes governing the evolution of mixed NYF+LCT granitic pegmatite and promote the Piława Górna occurrence as a world model occurrence of such category of pegmatites,
- add to understanding of the pegmatite-forming processes in the Góry Sowie Block, relate this pegmatite-forming event to similar events in other parts of the NE part of the European Variscides,
- draw attention of Polish scientific and industrial communities to possible economic aspects of such concentrations of certain rare elements (Li, Cs, Be, Nb, Ta, etc).
- last but not least, give an opportunity to publish the results in highly-impacted international journals, creates a chance for the team to continue a close cooperation between different Polish academic units as well as to take part in the ongoing dispute with foreign mineralogists and crystallographers on the topics that are currently a matter of a hot scientific debate.