UNIVERSITY OF SILESIA
IN KATOWICE

PHD STUDENT IN THE DOCTORAL SCHOOL – CALL FOR APPLICATIONS

Position: PhD student in Earth Sciences discipline
Unit of the project realization: Faculty of Natural Sciences – University of Silesia in Katowice
Unit realizing the PhD student education: Doctoral School at the University of Silesia in Katowice

Scholarship is based on the investigation of the metallurgical slags from the territory of Poland. The aim of the investigation is a reconstruction of the methods of metals smelting in the time interval of V century B.C. to XIX century.
Investigations will be carried out in the frame of the project of Preludium-BIS, financed from NCN sources, entitled: „Reconstruction of historical (from the 5th century BC to the 19th century AD) metal smelting processes in Poland" (UMO-2019/35/O/ST10/00313) under leadership of prof. dr. hab. Aleksandra Gawęda.

Project description:
In recent years, increasing attention has been paid to pyrometallurgical slag research. Studies focus mainly on the describing their chemical and mineral composition, impact on the environment and temperature conditions of crystallization. Additionally, the attention paid to the possibilities of commercial use of slags e.g. for road constructions or cement production. Recently, these studies also raise the issue of recreating the historical metallurgical processes in the world. This topic is extremely important because the process that led to the formation of slag is one of the basic factors affecting the properties of that material. This project aims to recreate the metallurgical processes used from the 5th century BC until the 19th century AD in the current area of Poland. The additional aim is also to trace the evolution that has taken place in metal production methods in the period of 2 500 years. For this purpose, the following locations were selected for testing:

- Lower Silesia (many locations) - copper metallurgy
- Sławków - lead and silver metallurgy
- Złoty Stok - gold metallurgy
- Warkocz - iron metallurgy
- Nowa Słupia - iron metallurgy
- Tatras Mts. - iron metallurgy.

Because in many cases slags are the only remains of historical ore processing, they are the key to recreate the entire process. Their composition was influenced by the nature of the ore, additions to the batch to reduce the melting temperature or modify other melting parameters, melting temperature and oxidative-reduction conditions during the process and storage. Based on mineralogical and petrographic analyses of metallurgical slags, high-temperature experiments and thanks to the knowledge of the type of metal ores used in the process, it is possible to reproduce all these parameters. It also enables the development of a furnace design used in the smelting process.

The presence of wood/charcoal within the tested slags or the occurrence of ceramic samples in the examined location allows the absolute dating using the radiocarbon or thermoluminescence method. The results obtained, however, have a much wider application than just archaeometric information. Due to the unique phase and chemical composition of these slags (high concentrations of Potentially Toxic Elements = PTE), the results will allow to determine the extremely long term impact of this material on the surrounding environment, the identification of minerals most resistant to weathering processes and the description of the unique phases building the studied slags. No less important is the impact of project implementation on local communities. Due to the growing popularity of industrial festivals, proper use of the results can significantly increase the tourist attractiveness of the places where the project's sites are located.

Requirements:

1. MSc diploma in geology (preferred persons with excellent final note)
2. Fluency in English (written and spoken)
3. Familiarity with Auto-CAD software (with certificate)
4. High motivation to realize the scientific investigations coupled with ability to work in a team
5. Documented scientific achievements in Earth Sciences (preferred co-authorship of the paper published in a journal from the so-called Filadelphian List), experience in presentation of the results during conferences
6. Experience in modelling of chemo-physical processes in metallurgical slags
7. Taking into account the required teaching during PhD studies fluency in Polish is necessary.

Required documents:

1. Motivation list with a description of the scientific interests
2. CV
3. List of scientific publications with per-cent of the contribution of the candidate
4. Copy of the MSc diploma

Candidates should register in IRK system and select „Doctoral School – admission to a grant" (https://irk.us.edu.pl/, accessible from 15.07.2020).

Documents should be delivered till **15.08.2020** to e-mail: aleksandra.gaweda@us.edu.pl. In case of questions, before the formal application please contact to the grant leader for the e-mail address given above.
Documents will be rated by the commission, led by the project leader prof. dr hab. Aleksandra Gawęda. Recruitment will be carried out according to the NCN regulations. Recruitment can be carried out both in Polish and in English. Meeting will be organized on **18.08.2020** in the Doctoral School office. Final decision will be sent to candidates via e-mail till **20.08.2020.**