

## Registration form

This is a registration form for Host Institutions wanting to establish a Dioscuri Centre of Scientific Excellence within Dioscuri 4 call.

### Registration form for Polish research institution

- 1. Research institution data (name and address):**  
**University of Silesia in Katowice,**  
ul. Bankowa 12, 40-007 Katowice, Poland  
ph: +48 32 35922 22,  
e-mail: rektor@us.edu.pl
- 2. Type of research institution<sup>1</sup>:**  
1) higher education institution
- 3. Head of the institution:** prof. dr hab. Ryszard Koziołek
- 4. Contact information of designated person(s) for applicants and the NCN: first and last name, position, e-mail address, phone number, correspondence address:** prof dr hab Leszek Marynowski, Dean of the Faculty of Natural Sciences of the University of Silesia in Katowice, leszek.marynowski@us.edu.pl,+ 48 32 368 9244, ul. Będzińska 60, 41 -200 Sosnowiec Room: 230 lab
- 5. Research discipline in which the strong international position of the institution ensures establishing a Dioscuri Centre (select one from the 25 listed disciplines):**

Natural Sciences and Technology

- Mathematics
- Fundamental constituents of matter
- Condensed matter physics
- Chemistry
- Materials
- Computer science and informatics
- Systems and communication engineering
- Production and processes engineering
- Astronomy and space research
- Earth sciences

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1 As specified in "Addressees of the call"

**6. Description of important research achievements from the selected discipline from the last 5 years including a list of the most important publications, patents, other (up to one page in A4 format):**

**Mineralogical studies:**

The general research topic is connected with "New minerals in pyrometamorphic rock" and "Rare, critical and ore minerals with particular emphasis on pegmatite minerals". It covers a number of specific projects, the main goal of which is the discovery and description of new and rare minerals.

*Four important publications (authors from INoZ underlined):*

Juroszek, R; Krüger, B; Galuskina, I; Krüger, H; Vapnik, Y; Galuskin, E., 2020. Siwaqaite,  $\text{Ca}_6\text{Al}_2(\text{CrO}_4)_3(\text{OH})_{12}\cdot 26\text{H}_2\text{O}$ , a new mineral of the ettringite group from the pyrometamorphic Daba-Siwaqa complex, Jordan. *American Mineralogist*, 105 (3), pp. 409-421, ISSN: 0003004X

Galuskin, E V; Krüger, B; Galuskina, I O; Krüger, H; Vapnik, Y; Pauluhn, A; Olieric, V., 2018. Stracherite,  $\text{BaCa}_6(\text{SiO}_4)_2[(\text{PO}_4)(\text{CO}_3)]\text{F}$ , the first  $\text{CO}_3$ -bearing intercalated hexagonal antiperovskite from Negev Desert, Israel. *American Mineralogist*, 103 (10), pp. 1699-1706, ISSN: 0003004X

Juroszek, R; Krüger, B; Banasik, K; Vapnik, Y; Galuskina, I., 2018. Raman spectroscopy and structural study of baryte-hashemite solid solution from pyrometamorphic rocks of the Hatrurim Complex, Israel. *Spectrochimica Acta - Part A: Molecular and Biomolecular Spectroscopy*, 205, pp. 582-592, ISSN: 13861425

Szeleg, E; Zuzens, B; Hawthorne, F C; Pieczka, A; Szuszkiewicz, A; Turniak, K; Nejbart, K; Ilnicki, S S; Friis, H; Makovicky, E; Weller, M T; Lemée-Cailleau, M –H., 2017. Bohseite, ideally  $\text{Ca}_4\text{Be}_4\text{Si}_9\text{O}_{24}(\text{OH})_4$ , from the Piława Górna quarry, the Góry Sowie Block, SW Poland. *Mineralogical Magazine*, 81 (1), pp. 35-46, ISSN: 0026461X

**Petrological and petrochronological studies:**

The studies include a wide spectrum of crystallization and melting processes, their effects, and the interaction of melts (natural and synthetic) with the surrounding rocks/materials. This includes the dating of geological and anthropogenic processes using standard and novel isotopic methods on various minerals.

The two main research sub-topics are conducted:

1. Chronology and petrochronology of rocks and their petrogenesis in the vicinity of the East European Platform (Brunovistulia, Proto-Carpathians, South-European terranes) from the Neoproterozoic to Neogene, and chronology of Mesoproterozoic to Neoproterozoic events in southern Africa which can be linked with large igneous provinces (LIPs), climate change and paleogeography.
2. Experimental investigation of pyrometallurgical slags and ceramics from southern Poland, as well as potentially toxic element (PTE) migration from slags and related wastes, to the natural environment; and finally, geochemical stability/instability of the pyrometallurgical wastes.

*Four important publications (authors from INoZ underlined):*

Burda, J; Klötzli, U; Majka, J; Chew, D; Li, Q -L; Liu, Y; Gawęda, A; Wiedenbeck, M., 2021. Tracing Proterozoic - Qaidam Ocean vestiges into the Western Tatra Mountains and implications for the Palaeozoic palaeogeography of Central Europe. *Gondwana Research*, 91, pp. 188-204, ISSN: 1342937X.

Warchulski, R; Gawęda, A; Kupczak, K; Banasik, K; Krzykowski, T., 2020. Slags from Ruda Śląska, Poland as a large-scale laboratory for the crystallization of rare natural rocks: melilitolites and paralavas. *Lithos*, 372-373, ISSN: 00244937.

Gumsley, A; Stamsnijder, J; Larsson, E; Söderlund, U; Naeraa, T; Kock, De M; Sałacińska, A; Gaweda, A; Humbert, F; Ernst, R., 2020. Neoproterozoic large igneous provinces on the Kaapvaal Craton in southern Africa re-define the formation of the Ventersdorp Supergroup and its temporal equivalents. Bulletin of the Geological Society of America, 132 (9-10), pp. 1829-1844, ISSN: 00167606.

Burda, J; Klötzli, U; Woskiewicz-Ślęzak, B; Li, Q-L; Liu, Y., 2020. Inherited or not inherited: Complexities in dating the atypical 'cold' Chopok granite (Nízke Tatry Mountains, Slovakia). Gondwana Research, 87, pp. 138-161, ISSN: 1342937X.

#### **Geochemical studies:**

The main scientific goal is the study of immature organic matter from the Mesozoic and Cenozoic formations, in the context of identifying rare and unknown organic compounds of biological origin (biomarkers and biomolecules). An important aspect of the research is to determine the genesis of such compounds and their diagenetic transformations, from the starting compound (biomolecule) to the geochemical structure (biomarker). In addition, the purpose of the research is to obtain palaeoecological information based on the genesis and concentration of identified biomarkers. The research will also be conducted on objects of anthropogenic origin (post-mining dumps), where, in addition to the primary compounds found in coal and coal-bearing rocks, the entire spectrum of secondary compounds occurs. Due to self-heating of dumps in high temperatures, carcinogenic and mutagenic compounds (e.g., PAH, phenols, etc.) can be formed and migrated.

*Four important publications (authors from INoZ underlined):*

Cieślak, E; Fabiańska, M.J., 2021. Preservation of geochemical markers during co-combustion of hard coal and various domestic waste materials. Science of the Total Environment, 768, 144638. ISSN: 00489697.

Kubik, R; Marynowski, L; Uhl, D; Jasper, A., 2020. Co-occurrence of charcoal, polycyclic aromatic hydrocarbons and terrestrial biomarkers in an early Permian swamp to lagoonal depositional system, Paraná Basin, Rio Grande do Sul, Brazil. International Journal of Coal Geology, 230, ISSN: 01665162.

Marynowski, L; Rahmonov, O; Smolarek-Lach, J; Rybicki, M; Simoneit, B R T., 2020. Origin and significance of saccharides during initial pedogenesis in a temperate climate region. Geoderma, 361, ISSN: 00167061.

Racki, G; Rakocinski, M; Marynowski, L; Wignall, P B., 2018. Mercury enrichments and the Frasnian-Famennian biotic crisis: A volcanic trigger proved? Geology, 46 (6), pp. 543-546, ISSN: 00917613

#### **7. List of no more than 3 important research projects from the selected discipline awarded in national and international calls to the institution in the last 5 years (title, name of PI, source of funding, amount of funding):**

The most significant and prestigious project carried out at the Institute of Earth Sciences was KNOW (Krajowy Naukowy Ośrodek Wiodący). Our former Faculty (of Earth Sciences) was a leader of the project together with two Polish Academy of Sciences Institutes: Institute of Oceanology and Institute of Geophysics. It was the only grant awarded to a consortium in the field of Earth sciences in Poland realized between 2014-2017.

Three large projects realized in last years in Institute of Earth Sciences are:

1. "Developing an integrated implementation framework" structural funds, from 01.05.2019 to 30.04.2022 (1 771 535.96 EUR)
2. "Modern education about environmental threats as a way to create new, specialized jobs" education project, from 01.01.2019 to 31.05.2022 (932 011.80 EUR)
3. Two projects concerning the analysis of saccharides in sedimentary organic matter: "Fungi as a Source of Novel Biomarkers in Sedimentary Organic Matter" from 28.06.2019 to 27.06.2022 and "Monosaccharides

and disaccharides as a new biomarkers from the Mesozoic and Cenozoic sedimentary rocks" from 07.07.2016 to 06.01.2021 (for a total sum: 319590EUR)

## **8. Description of the available laboratory and office space for the Dioscuri Centre (up to one page in A4 format):**

The Institute of Earth Sciences can offer a 40 m<sup>2</sup> (two offices) space for the Dioscuri Centre and in addition the space of several laboratories dedicated to diverse analytical procedures related to mineralogy, geochemistry, and petrography, including:

- Laboratory of Scanning Microscopy,
- Laboratory of XRD Diffraction
- Laboratory of Gas Chromatography-Mass Spectrometry,
- Laboratory of High Pressure-Liquid Chromatography,
- Laboratory of Raman Spectroscopy,
- Laboratory of Inorganic Geochemistry.

Up to date, these laboratories were dedicated to the studies from the following areas:

- identification of new minerals in pegmatites and pyrometamorphic rocks,
- experimental petrology and petrochronology,
- geochemical and mineralogical characteristics of meteorites,
- organic compounds, their genesis and occurrence in sedimentary rocks, aerosols and anthropogenic wastes,
- reconstruction of paleoenvironments using geochemical, petrographic, sedimentological and paleontological methods,
- global events and mass extinctions.

The space and equipment of these laboratories will be shared with other entities of the Institute on the basis of the scheduled time agreed between the Institute and the Dioscuri Centre. Cooperation of Dioscuri Center with other labs of University of Silesia will also be possible if actions are announced some time in advance.

## **9. List of the available research equipment for the Dioscuri Centre:**

The main equipment available for Dioscuri Centre includes:

- Beta-ray spectrometer: ETL2/51AM3/2-P-X Beta Scintillation Detector
- ICE 3000 SERIES flame atomic absorption spectrometer by Thermo Scientific
- Raman spectrometer Witec alpha 300R
- Gamma-ray spectrometry system GX4018
- Infrared FT-IR Spectrometer NICOLET IS10 MID
- Ion Chromatograph METROHM, for analysis of cations and anions in water
- Agilent Technologies 7890A gas chromatograph and Agilent 5975C Network mass spectrometer with Triple-Axis Detector (MSD)
- Elemental Analyzer Eltra CS-500 for C and S determination, Leco type
- The Quanta 250 Environmental Scanning Electron Microscope (SEM) with Thermo Fisher Scientific's EDS UltraDry X-ray microanalyzer
- Philips XL30 Environmental Scanning Microscope (SEM) with EDS Sapphire X-ray microanalyzer by EDAX
- Axio Imager.A2m Microscope From Zeiss With Msp200 Photometer And AxioCam Mrc 5 Digital Camera
- Philips X-ray diffractometer model X'PERT PW 3710
- X-ray diffractometer by PANalytical, MPDX, PERT PROPW3040 / 60
- DMA 80 Mercury Analyzer

In addition, the Institute may also provide an access to other facilities, including Laboratory of Transmission and Scanning Electron Microscopy, Confocal and Fluorescent Microscopy, the Laboratory of Flow Cytometry or to the Laboratory of Histology and Immunohistology, which are equipped with Ultra-high Resolution Cold Field Emission Scanning Electron Microscope with energy dispersive X-ray spectrometer and PolarPrep 2000 Cryo Transfer System, Transmission Electron Microscope Hitachi H-500, Nikon Eclipse Ni-U fluorescent microscope, Olympus FV-1000 confocal system equipped with an Olympus IX81 inverted microscope and Flow Cytometer Sysmex CyFlow.

**10. List of the additional benefits (other than listed in call text) that the Institution declares to provide for the Dioscuri Centre (i.e.: additional funds, personal benefits, other) (up to one page in A4 format):**

Personal benefits

- Free of charge accommodation for the researcher and his/her family, including assistance in formalities
- Assistance in residence formalities for the researcher and his/her family, school and/or nursery arrangements for children, employment formalities for spouse/partner (if applicable)
- Additional health insurance and private medical package for the researcher and his/her family
- Polish language course for the researcher and his/her family
- Public transport card for the researcher and his/her family
- Benefit Systems sports cards for the researcher and his/her family
- Entry cards for cultural and educational facilities, e.g.: the National Symphonic Orchestra of the Polish Radio, the Silesian Philharmonic, cinemas, museums, galleries and theatres
- Study Visit Poland – programme of exploring Polish heritage sites
- Participation in local events and networking with key stakeholders

**11. Other information about the internationalisation of the research institution, international researchers employed at the institution, the availability of English language seminars etc. (up to one page in A4 format): \_\_\_\_\_**

International cooperation and exchange are essential aspects of the activity of the University of Silesia in Katowice. The intensive international collaboration conducted by the University of Silesia allows for academic exchange and undertaking various educational and scientific projects together with partners from over 90 countries around the world.

Annually, the offer of academic exchange is used by approximately 700 students and doctoral students of the University of Silesia and approximately 2,000 employees whose trips are related to the implementation of research, international projects, and participation in conferences as educational and didactic activities. At the same time, our university is visited by approximately 2,800 research, teaching, and administrative staff representing partner institutions.

Collaboration under international research projects includes the implementation of joint research and the dissemination of its results through the organization of seminars and conferences, as well as publishing activities. Scientists benefit from scholarships and internships in prestigious research centers worldwide, which significantly influences the shaping and development of their scientific careers.

A significant factor contributing to universities' internationalization is the number of foreigners completing their studies there. The University of Silesia, in cooperation with foreign partners, conducts study programs, the graduates of which obtain double diplomas.

The University of Silesia in Katowice, together with six universities from abroad, forms a prestigious European University as part of Transform4Europe alliance. The universities have got together to conduct joint scientific research at the highest level and educate young people within international study programmes. They will also create a common multilingual campus in order to take care of the future of their own regions, countries, and entire Europe.

The University of Silesia is a member of many international academic organizations. University representatives sit on steering committees and act as experts in networks and associations associating the academic community worldwide.

The university cooperates with key organizations, including the European University Association (EUA), L'Agence Universitaire de la Francophonie (AUF), and the European University Information System (EUNIS).