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 the Polish research institution

1. Research institution data (name and address):

   Jerzy Haber Institute of Catalysis and Surface Chemistry, Polish Academy of Sciences

   ul. Niezapominajek 8, PL-30239 Krakow, Poland

2. Type of research institution[1] (select one from the 9 listed options):

   A research unit of the Polish Academy of Sciences

3. Head of the institution:

   prof. dr hab. Małgorzata Witko, member of Polish Academy of Sciences, member of Academia Europea, dr.h.c.

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. Maciej Szaleniec, Deputy Director for Research

   e-mail: Maciej.Szaleniec@ikifp.edu.pl, phone: +48126385101

   correspondence address: Jerzy Haber Institute of Catalysis and Surface Chemistry, Polish Academy of Sciences

   ul. Niezapominajek 8, PL-30239 Krakow, Poland

5. Research discipline in which the strong international position of the institution ensures establishing a Dioscuri Centre (select one from the 25 listed disciplines):

Life Sciences

☐ Molecular biology, structural biology, biotechnology

☐ Genetics, genomics

1 As specified in "Addressees of the call"

☐ Cellular and developmental biology

☐ Biology of tissues, organs and organisms

☐ Human and animal non-infectious diseases

☐ Human and animal immunology and infection

☐ Diagnostic tools, therapies and public health

☐ Evolutionary and environmental biology

☒ Applied life sciences and biotechnology

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*):

During the last 5 years, ISCS PAS has achieved several important discoveries in the field of protein chemistry, enzymology, and biotechnology. The mechanism of anaerobic regioselective steroid hydroxylation by steroid C25 dehydrogenase was elucidated with help of advanced modeling methods and technology was obtained, which is now further developed in cooperation with industrial partners. Also, the ISCS is at the forefront of European research on bacterial bioplastics developing biodegradable plastics for medicine and biorefineries. This biotechnology has its application also in green chemistry providing valuable chiral synthons.

Most important publications in the field of biotechnology 2016-2020:

D. Seyhan, et al., "Elucidating the Stereochemistry of Enzymatic Benzylsuccinate Synthesis with Chirally Labeled Toluene", Angew. Chem. Int. Ed., 5 (2016) 11664–11667

A. Rugor, et al., "Regioselective hydroxylation of cholecalciferol, cholesterol and other sterol derivatives by steroid C25 dehydrogenase", Appl. Microbiol. Biotechnol., 101 (2017) 1163-1174

M.G. Quesne, T. Borowski, S.P. de Visser, "Quantum Mechanics/Molecular Mechanics Modeling of Enzymatic Processes: Caveats and Breakthroughs", Chemistry - A European Journal, 22 (2016) 2562 – 2581

K. Harazna, et al., "Polyhydroxyalkanoate derived hydrogen bond donors for synthesis of new Deep Eutectic Solvents", Green Chem., 21 (2019) 3116-3126

Z. Adamczyk, et al, "Albumin Adsorption at Solid Substrates: A Quest for a Unified Approach", J. Colloid Interface Sci., 514 (2018) 769–790

Patents granted in 2016-2020:

A. Rugor, M. Szaleniec, J. Staroń, „Method for obtaining 25-hydroxylated vitamin D3 (calcifediol)", Polish Patent PL 235932 (2020)

J., Bryjak, P. Nowak, M.Z. Tataruch, M. Szaleniec, „Method for obtaining chirally pure alkylaromatic and alkyloheterocyclic alcohols and the reactor system for execution of this method", Polish Patent PL 225172 (2017)

A.M. Wojtkiewicz, M.Z. Tataruch, A. Jarzębski, K. Szymańska, M. Szaleniec, A.K. Knack, „Method for obtaining obtaining 25-hydroxylated sterol derivatives, including 25-hydroxy-7-dehydrocholesterol", Polish Patent PL 226816 (2017)

T. Janeczko, E. Kostrzewa-Susłow, M. Szaleniec, A.M. Wojtkiewicz, M. Dymarska, „Method for producing androst-1,4,6-trien-3-on-17-ole acetate", Polish Patent PL 228070 (2018)

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):

[2017-2020] "New Functionalised Polymers for Biomedical Applications", Ph.D. Maciej Guzik, NCBiR LIDER, LIDER/27/0090/L-7/15/NCBR/2016, National Centre for Research and Development, funds: 1 198 950 PLN

[2019-2023] "Vegetable oil biorefining technology for production of advanced composite materials", Ph.D. Maciej Guzik, Strategic Research Project NCBiR TechMatStrateg, TECHMATSTRATEG2/407507/1/NCBR/2019, National Centre for Research and Development, funds for goal: 14 265 123 PLN

[2020-2023] "Structure and function of fumarate-adding glycyl radical enzymes: biochemistry, modelling and application", Professor Maciej Szaleniec, NCN/DFG BEETHOVEN LIFE 1, 2018/31/F/NZ1/01856 (cooperation with Marburg University, Germany), National Science Centre/Deutsche Forschungsgemeinschaft, funds: 1 225 211 PLN/221 750 Euro

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

The Dioscuri Centre will use an existing laboratory of ICSC PAS, which is devoted to catalytic research. The laboratory room is 40 sq m large and it is well equipped with general laboratory devices (technical gases installations, vacuum hood) and bench space. Basic laboratory materials (e.g. general reactants) and consumables (e.g. laboratory glass) are already in place. The Dioscuri Centre will have access to all scientific instruments available at ICSC PAS (see below).
The office space of the head of the Dioscuri Centre will be a 20 sq m office room equipped with appropriate furniture, phone and a personal computer with an internet connection. Additional office space will be available for Dioscuri research personnel, depending on the needs of the Centre. The Institute has a valid subscription to major scientific literature databases (e.g. Web of Science, Scopus,

Reaxys.) and a wide spectrum of scientific literature is available in an electronic form (Wiley, Springer, Elsevier, RSC, ACS, APS, etc.). The Institute library has a rich collection of scientific books and periodicals.

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

ICSC PAS is equipped with state-of-the-art research facilities, in many cases unique on the national scale.

The Institute is well equipped with up-to-date instruments for research in the field of biotechnology, such as:

- 2x5 L Fermentor (and 5-200 L fermentation line in construction)
- Anaerobic glove-box
- Several incubators with temperature regulation and shakers
- Liquid chromatograph FPLC AKTApurifier UPC 10 with UPC-900 UV detector and fraction collector (in anaerobic glove-box)
- Liquid preparative chromatograph FPLC NGC Quest 10 Plus system (Biorad)
- Liquid chromatograph GE AKTA Start
- LC-MS with DAD detector and mass detection Agilent 1100 VL LC-MS (ionization ESI and APCI)
- LC-MS/MS Agilent 1290 Infinity UHPLC with 6460 Triple Quad MS detector (ionization ESI and APCI)
- Spectrophotometer UV/vis Shimadzu UV-2700 with Peltier thermostatic and RX 2000 stopped-flow module (Photophysics)
- Epoch Microplate Spectrophotometer (BioTek Instruments)
- BioTek Instruments hybrid multi-detection Synergy H1M microplate reader
- ATR-FTIR spectrometer
- Autoclave Tuttnauer D-line 5075 ELV
- Shaking incubator New Brunswick Excella E24R
- High-pressure laboratory homogenizer EmulsiFlex-C3 (Avestin)
- BioRad protein-gel electrophoresis Mini-Protean
- SUBMINI for fast DNA electrophoresis
- CFX Connect Real-Time PCR Detection System
- Baker Solid Phase Extraction chamber
- Preparative centrifuge Hettich RotoSilenta 630 RS - 6 x 1L; High-speed centrifuge Hermle Z36HK
- Ultra-low Freezer PLATINUM Next V -86°C
- Microscope Olympus SZX10
- Leica DMI6000B Inverted Fluorescent Microscope
- Confocal microscope Zeiss LSM 780
- Atomic force microscopes NT-MDT cooperating with Optical microscopes Olympus
- Zetasizer ZS model ZEN3600 from Malvern

- Quartz Crystal Microbalance with Dissipation Monitoring (QCM-D)/ Qsense E1 Chamber
- DMA 5000 M densitometer from Anton Paar GmbH
- Imaging spectroscopic ellipsometer
- Laminar flow cabinet
- Quantum chemistry programs: Gaussian 09, Jaguar, Molcas Programs for classical simulations: Amber, NAMD2, AutoDock, Modeller
- Dynochem software package for bioprocess modeling and scaling (Scale-Up Systems)

The Institute shares its facilities in the frame of joint-laboratories within a wide scientific community, with a prime example of PEEM/XAS line of Solaris National Synchrotron Radiation Centre or Joint Laboratory of Biotechnology and Enzyme Catalysis.

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*):

Ph.D. studies affiliated at the Institute, which have been awarded the "Chemistry Doctorate Eurolabel" by the European Chemistry Thematic Network and various interdisciplinary Ph.D. projects in which the Institute participates make the Institute benefits from a steady inflow of young researchers.

In 2016 ICSC PAS was awarded the "HR Excellence in Research" logo. This recognition reflects the commitment of the Institute to continuously improving its human resources policies in line with the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers. The award confirms the efforts of the Institute to ensure fair and transparent recruitment and appraisal procedures.

Subsidized theatre and philharmonic tickets and subsidized access to sports facilities are available for all employees.

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

ERASMUS+
The Institute participates in the ERASMUS+ network and both Ph.D. students and employees benefit from research and training visits at foreign research institutions financed by this network. In addition, the Institute regularly hosts visiting students from abroad.

International cooperation

The Institute has a long-standing tradition of both national and international cooperation. The international contacts manifest in numerous joint research projects realized by ICSC PAS.

The Institute actively participates as a partner in the UE research projects under Horizon 2020 Programme: "ENERGY-X: Transformative chemistry for a sustainable energy future" (Coordination & Support Action; 2019-2020); "CollectionCare - Innovative and affordable service for the Preventive Conservation monitoring of individual Cultural Artefacts during display, storage, handling and transport"(Research & Innovation Action; 2019-2022), nanoPaint - "Dynamics of dense nanosuspensions: a pathway to novel functional materials"(MSCA- Innovative Training Networks; 2021-2024). The Institute participates also in the actions of the COST Initiative; is a partner of the EU COST Actions: "A new network of European Bioimage Analyst to Advance Life Science Imaging" (2016-2020) and "Computational materials sciences for efficient water splitting with nanocrystals from abundant elements" (2019- 2023).
ICSC PAS is also coordinating the project in the frame of Solar-Driven Chemistry - a network initiated by the German research funding agency DFG - "SolarMethaChem: Solar light-driven photochemical processes for methane chemical conversion to valuable products" (2020-2023) and is a partner in the EIG-CONCERT JAPAN project “Multifunctional, high-performance materials: the porous composites for membrane processes” X-MEM (2019-2022) and NCN/DFG BEETHOVEN LIFE 1 “Structure and function of fumarate-adding glycyl radical enzymes: biochemistry, modelling and application”.
Moreover, currently, ICSC PAS is coordinating the project in the frame of the Polish-Norwegian Research Programme: "GRIEG - Model of paintings with craquelure patterns for evidence-based environmental control in museums" (2020 -2022). The Institute is also a partner of the project funded by the Research Council of Norway -" SyMBoL - Sustainable Management of heritage Buildings in a Long-term perspective: (2018-2021).
ICSC PAS is involved in numerous bilateral agreements (with – among others – Bulgaria, Czech Republic, Germany, Italy, Ukraine) and many informal collaborations.
All sorts of international collaborations result in a significant number of scientific papers published each year with co-authors from abroad (e.g. in 2020 54 out of 154 total papers published by ICSC PAS).

International conferences organized by ICSC PAS

The Institute regularly organizes international conferences in the field of catalysis and surface chemistry. As the most recent examples may serve: 8th World Congress on Oxidation Catalysis 2017, European School on Interfacial Engineering: Fundamentals, Applications, and Analytical Methods ESIE 2017, 16th International Conference on Theoretical Aspects of Catalysis ICTAC-16 2016, 4th, 5th, and 6th Meeting 'X-ray and other techniques in investigations of the objects of cultural heritage' 2012, 2014, 2016, 15th European Student Colloid

Conference 2015, 3rd, and 4th International Symposium on Surface Imaging/Spectroscopy at the Solid/Liquid Interface 2012, 2015, 8th, and 9th International Symposium „Surface Heterogeneity Effects in Adsorption and Catalysis on Solids 2012, 2015, International Symposium on Air & Water Pollution Abatement Catalysis 2014, 5th International Workshop Bubble and Drop Interfaces B&D 2012.

The Institute often hosts visiting professors from abroad, who give lectures or seminars (in English) that are open for the whole scientific community in Krakow. The Institute successfully attracts postdoctoral fellows from abroad (recently from Belarus, Bulgaria, India, Iran, previously from Germany, UK, India, USA, Pakistan).