

Registration Form - declaration of willingness for establishing interdisciplinary Dioscuri Centres of Scientific Excellence

This is a registration form for Host Institutions wanting to establish an interdisciplinary Dioscuri Centre of Scientific Excellence within [Dioscuri 5 call](#).

Registration form for Polish research institution

1. Research institution data (name and address):

The International Institute of Molecular Mechanisms and Machines Polish Academy of Sciences, Flisa 6, 02-247 Warsaw, Poland.

2. Type of research institution¹:

Scientific institutes of PAN

3. Head of the Institution: **prof. Agnieszka Chacińska, Director**
4. Contact information of designated person(s) for applicants and the NCN: first and last name, position, e-mail address, phone number, correspondence address:

Emilia Chmielewska, Grant Office IMol, phone +48 605 825 078, e-mail: grantoffice@imol.institute, ul. Flisa 6, 02-247 Warsaw, Poland
5. Research disciplines in which the institution ensures establishing of an interdisciplinary Dioscuri Centre (select two (and if necessary three) of the domains that should be combined; select two (or if necessary three) from the 25 listed auxiliary panels of disciplines). Provide two (and if necessary three) specific NCN subpanels according to the list².

DOMAIN: Life Sciences³

- x Molecules of Life: Biological Mechanisms, Structures and Functions
- x Integrative Biology: from Genes and Genomes to Systems
- x Cellular, Developmental and Regenerative Biology

² Lists of the disciplines for each auxiliary panel of disciplines to be found here:
<https://www.ncn.gov.pl/en/finansowanie-nauki/panele-ncn>

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- x Physiology in Health, Disease and Ageing
- x Biotechnology and Biosystems Engineering

DOMAIN: Physical Sciences and Engineering⁴

- x Chemistry
- x Synthetic Chemistry and Materials Science
- x Computer science and informatics

⁴ Lists of the disciplines for each auxiliary panel of disciplines to be found here:
<https://www.ncn.gov.pl/en/finansowanie-nauki/panele-ncn>

6. Description of important research achievements from the selected disciplines from the last 5 years including a list of the most important publications, data bases, series of workshops, patents, policy briefs, field work/ field site, exhibitions, other:

List of publication:

- a) **Borrero-Landazabal, M. A., Linke, V., Kadavá, T., Li, Z., Draczkowski, P., Kaszuba, K., Bertgen, L., Serwa, R. A., Heck, A. J. R., & Chacinska, A.** (2026). A dynamic gateway: Uncovering the expanded human TOM complex interactome and its regulatory complexity. *Science advances*, 12(18), eaeb2995. <https://doi.org/10.1126/sciadv.aeb2995>
- b) **De Franceschi, N., Barth, R., Meindlhuber, S., Fragasso, A., & Dekker, C.** (2024). Dynamin A as a one-component division machinery for synthetic cells. *Nature nanotechnology*, 19(1), 70–76. <https://doi.org/10.1038/s41565-023-01510-3>
- c) Dias, M. H., **Liudkovska, V.**, Montenegro Navarro, J., Giebel, L., Champagne, J., Papagianni, C., Bleijerveld, O. B., Velds, A., Agami, R., Bernards, R., & **Cieśla, M.** (2024). The phosphatase inhibitor LB-100 creates neoantigens in colon cancer cells through perturbation of mRNA splicing. *EMBO reports*, 25(5), 2220–2238. <https://doi.org/10.1038/s44319-024-00128-3>
- d) **Kamila Karpińska, Dawid Mehlich, Venkata R. Sabbasani, Michał Łomiak, Pedro Torres-Ayuso, Katarzyna Wróbel, Vi N. Truong, Remigiusz Serwa, Rolf E. Swenson, John Brognard, Anna A. Marusiak.** Selective degradation of MLK3 by a novel CEP1347-VHL-02 PROTAC compound limits the oncogenic potential of TNBC. *Journal of Medicinal Chemistry*, 2024, J.
- e) Bujnicki, J. M., & **Baulin, E. F.** (2025). Exploring GNRA tetraloop-like motifs in nucleic acid 3D structures. *Scientific reports*, 15(1), 37081. <https://doi.org/10.1038/s41598-025-21072-9>

The Institute's key scientific achievement with major societal and economic impact was the launch of the Interdisciplinary Chemical Proteomics Platform — a unique integration of chemistry, biology, and proteomics. The platform enables advanced analysis of drug–protein interactions, mechanism-of-action studies, and therapeutic target validation. Developed from academic research into a biotechnology-compatible R&D infrastructure, it provides innovative technologies including bioorthogonal protein labeling, molecular probes, and chemoproteomics, strengthening drug discovery and biotechnology research in Poland.

PROTAC-based targeted protein degradation for cancer therapy — in collaboration with NIH, IMoI PAN developed 27 novel PROTAC degraders targeting the oncogenic kinase LZK in head and neck squamous cell carcinoma, demonstrating selective degradation and anti-cancer activity.

Polyamine-dependent target identification methodology — IMoI PAN developed photoactivatable polyamine analogs to map small molecule–protein interactions in living cells, with potential applications in stress-response biology and neurodegenerative disease research.

7. List of no more than 4 important research projects from the selected disciplines awarded in national and international calls to the institution in the last 5 years (title, name of PI, source of funding, amount of funding):

- HE MSCA COFUND Postdoctoral programme (in consortium): *Advanced Multiscale Biological Imaging using European Infrastructures* European Research Executive Agency (REA); from 2024-10-01 to 2029-09-30; 612 000.00.PLN for IMol, total for the grant: 6 017 760 PLN, PI: prof. dr hab. Agnieszka Chacińska,
- NCN SONATA BIS 12 Reconstitution of viral double-membrane vesicles: towards in vitro organellogenesis, from 2023-04-14 to 2028-04-13, total for the grant 4,744,640 PLN, PI dr Nicola De Franceschi,
- NCN SONATA BIS 12 Bunyaviral strategies to reorganize and exploit cellular translation, from 2023-03-15 to 2028-03-14, total for the grant 4,890,600 PLN, PI dr Piotr Grlach,
- NCN SONATA BIS 11 Proline metabolism as a novel therapeutic target for diseases associated with mitochondrial dysfunction, from 2022-03-24 to 2027-03-23, total for the grant 4,240,080 PLN, PI dr Karolina Szczepanowska.

8. Description of the available office space, working space, laboratory for the Dioscuri Centre:

IMol is located in the Flanders Business Park C building at 6 Marcin Flisa Street in Warsaw, where it leases, under a long-term agreement, approximately 3000 m².

A major organisational feature of IMol is its open-space laboratory and office model, inspired by leading international research institutes. This model is based on shared equipment, central infrastructure management, and flexible space allocation adjusted to the size and current needs of individual groups. It promotes collaboration between research teams, facilitates the exchange of expertise, and ensures efficient use of shared resources.

Research groups currently use laboratory space, comprising open laboratory areas and dedicated zones for shared research infrastructure. These include specialised laboratories for isotope work, cell culture, microscopy, and instrumentation, as well as storage areas and dedicated space for the Proteomics and Medicinal Chemistry Core Facilities. The office area includes open-space workstations for researchers, private offices for group leaders and directors, seminar and meeting rooms, lecture rooms, server space, storage areas, the Scientific Projects Office, and dedicated administrative space. This integrated arrangement of laboratory and office functions within one building strongly supports interactions, scientific discussion, efficient coordination of projects, and further institutional scaling.

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

At IMol, we maintain a policy of shared access to core scientific equipment and laboratory infrastructure. We provide extensive shared and group-level research infrastructure supporting molecular biology, cell biology, biochemistry, chemical biology, medicinal chemistry, and proteomics. The Principal Investigator will have full access to the Institute's shared equipment base as well as to specialised core facilities and expert support. Together, these resources enable the execution of a complete experimental programme ranging from molecular and biochemical assays to imaging, cell-based studies, and complex organismal analyses.

Basic and broadly accessible equipment available at IMol includes standard and advanced centrifuges, thermocyclers, spectrophotometers, plate readers, incubators, shakers, fluorescence and routine microscopy systems, molecular imaging devices, cell culture infrastructure, isotope laboratory, cold-storage facilities, and common laboratory support equipment. Quantitative nucleic acid analyses are supported by qPCR systems including LightCycler 480 (Roche) and QuantStudio 1 (Thermo Fisher), as well as a NanoDrop spectrophotometer for routine nucleic acid and protein quantification.

Protein and biochemical workflows are supported by SDS-PAGE and Western blot platforms with advanced detection systems, including Amersham ImageQuant 800 and Amersham Typhoon imaging systems. Additional molecular and biochemical capabilities include Synergy Neo2 plate reader, Bioscreen C Pro for continuous monitoring of cell growth, BioComp Gradient Station for gradient preparation and fractionation, and preparative ultracentrifugation systems including Avanti JXN-26 and Optima XPN 80. IMol also provides access to a high-pressure homogenizer and to ÄKTA-based protein purification systems, as well as specialised infrastructure for baculovirus-based protein expression.

Cell-based and functional studies are supported by dedicated cell culture rooms and specialised equipment, including the InvivoO2 Hypoxia Workstation (Baker) for experiments under controlled oxygen conditions and the Novocyte 2000R (Agilent) flow cytometer for cell phenotyping and population analysis. Efficient delivery of nucleic acids into challenging cell types is enabled by the 4D-Nucleofector X Unit. Single-cell transcriptomics workflows are supported by the 10x Genomics Chromium Single Cell Controller.

IMol also provides extensive imaging infrastructure. This includes routine and advanced microscopy platforms such as the Zeiss Axio Observer 5 fluorescence microscope and a recently acquired ZEISS LSM 910 confocal microscope (available since September 2025), which enables high-resolution 2D and 3D imaging and advanced analysis of cellular architecture and dynamics.

10. List of the additional benefits (other than listed in invitation call) that the Institution declares to provide for the Dioscuri Centre (i.e.: additional funds, personal benefits, other):

A major element of the Institute's research infrastructure is the Proteomics Core Facility, led by Dr Remigiusz Serwa. The facility is equipped with an advanced Thermo Scientific Q-Exactive HF-X mass spectrometer coupled to a Dionex UltiMate 3000 nano-LC system with fraction collector and EASY-Spray ion source, which serves as a key platform for advanced proteomic analyses within the Proteomics Core Facility. The facility provides expert support in sample preparation, nanoLC-MS/MS measurements, data analysis, and bioinformatic processing. Fees for its services are charged on an internal, highly competitive basis and are therefore significantly lower than those for external users. IMol has also been strengthening its infrastructure in medicinal chemistry and chemical proteomics, offering specialized expertise.

Additional specialised resources include dedicated radioisotope laboratories, infrastructure for baculovirus-based protein expression, and an automated Zebrabox system for zebrafish behaviour analysis, supporting organismal and functional studies. IMol is also further developing its specialised core infrastructure in medicinal chemistry and chemical proteomics, including the emerging Medicinal Chemistry Core Facility.

Researchers also benefit from access to a fully equipped cell culture room, isotope room, laboratory kitchen, and other shared laboratory infrastructure. Access to shared cold-storage facilities, including $-80\text{ }^{\circ}\text{C}$ and $-20\text{ }^{\circ}\text{C}$ freezers, refrigerators, and a cold room, is also provided. Importantly, newly recruited group leaders are offered fully organised and furnished laboratory and office space, enabling them to begin their work immediately without having to build their working environment from scratch.

Lab managers support all research groups across the Institute, ensuring continuity of laboratory operations, efficient coordination of shared infrastructure, and an institute-wide understanding of laboratory needs. Early-career group leaders additionally benefit from collegial mentoring, including support in grant proposal development, mock interviews, and scientific and personnel-related discussions.

11. Other information about the internationalisation of the research institution e.g. international environment (international researchers community at the institution, internationalization of the management and administration), didactic in English, availability of Polish course for Foreigners etc.:

IMol is led by Professors Agnieszka Chacińska, as a Director, Magda Konarska, as a Deputy Director for Science, and Anna Marusiak as a Deputy Director for Development, advised by the international Scientific Board Chaired by prof. Victor Ambros. Acts in partnership with three prestigious scientific institutions: the University Medical Center Göttingen (Germany), the Weizmann Institute of Science in Rehovot (Israel), and the Institute of Organic Chemistry and Biochemistry of the Czech Academy of Sciences (Czechia). These are world-class units combining top-level science with successes in innovation and commercialization. At present, IMol hosts 14 research groups. In the institute work researchers from all over the world, nearly 50% of them are foreigners coming from 20 different countries.

They are provided with support by qualified lab managers, specialists, technicians, and administrative personnel. Assistance in grant writing on several levels from scientific conceptualization through admin parts allows to reach very high level in grant success rate, although ERC grants are still to come.

Transparent recruitment and a project-based employment model ensure high mobility and a natural turnover of staff, characteristic of modern institutes operating within the global scientific ecosystem. IMol fosters a young, dynamic environment in which researchers develop their skills, build international collaboration networks, and prepare for the next stages of their careers.

Recent recruitment of IMol Group Leaders broadly focused on chemical biology, medicinal chemistry and AI-driven approaches reinforced Institute's interdisciplinary model that integrates molecular biology, proteomics and translational research.