Institute of Molecular Physics
Polish Academy of Sciences

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Recruitment for the position of a doctoral student in the research project OPUS-28 and to the Poznan Doctoral School of Institutes of the Polish Academy of Sciences at the Institute of Molecular Physics of the Polish Academy of Sciences in Poznan.
Procedure no. 21/2025/IFM/PSD

Institution:	Institute of Molecular Physics Polish Academy of Sciences (IMP PAS)
City:	Poznań, Poland
Position:	Ph.D. student
Positions available:	1
Scientific discipline:	physics
Publication date:	17 September 2025
Application deadline:	16 October 2025; 15:00 CEST
IMP PAS website:	https://www.ifmpan.poznan.pl
PDS website:	https://www.ifmpan.poznan.pl/BIP/index.php/edukacja/psd-ipan

I. Offer description

Research and doctoral thesis will be carried out within the OPUS-28 project funded by the National Science Center

Project title: *MEtal-ion SupraMolecular Electrolyte membRanes for energy storage applications:desIgn, synthesiS, and charactErization*

Keywords: Zinc-ion solid electrolytes, Aluminum-ion solid electrolytes, supramolecular electrolyte membranes, selfassembly, thermoreversible, renewable structures

Project acronym: MESMERISE

Research group where the project will be implemented: Department of Physics of Molecular Systems and Radiospectroscopy Research PAS

Principal Investigator: dr hab. inż. Michał Bielejewski, prof. IMP PAS

II. Project objectives

The project involves developing a new generation of flexible and thermally renewable electrolyte membranes for zinc- and aluminum-ion batteries, as well as understanding the transport mechanism and intermolecular interactions of aluminum and zinc ions in the resulting supramolecular systems. The motivation for this research is the search for new ionically conductive materials for use in Al-ion and Zn-ion systems, exhibiting a reversible liquid-gel phase transition enabling the reconstruction of the internal structure of a worn/damaged membrane. These designed structures are consistent with the global trend of searching for materials that actively contribute to environmental protection (renewable internal structure of the stabilizing matrix) and demonstrate high performance while reducing or completely eliminating the use of polymer fractions. The obtained results will indicate milestones in the development of a new

generation of high-performance solid electrolytes with minimized environmental impact. Project members are working closely with partners from the Center for Advanced Technologies at Adam Mickiewicz University in Poznań. Adam Mickiewicz University and the Department of Physical Chemistry of the KTH Royal Institute of Technology in Stockholm, Sweden.

III.

The project focuses on the design, fabrication, and characterization of soft-matter systems capable of ion conduction, where various ionic species of aluminum and zinc will serve as charge carriers. Supramolecular structures composed of low molecular weight gelators (LMWGs) capable of gelling ionic solutions will serve as the internal framework. These molecules will be designed and fabricated in collaboration with the Center for Advanced Technologies at Adam Mickiewicz University. One of the goals will be the synthesis of new LMWG molecules that self-assemble into specific structures. One of the key features of the resulting membranes will be their unique mechanical properties: while maintaining flexibility, they will possess the ability to regenerate their internal structure, allowing for extended service life and easy repair of damaged matrices. Understanding the mechanisms of aluminum and zinc ion transport and the intermolecular interactions between ionic charge carriers and the gelator matrix in the resulting supramolecular systems will enable informed and targeted design of solid electrolytes. The project also involves conducting pioneering research in this area using nuclear magnetic resonance electrophoresis (eNMR), in collaboration with one of Europe's leading research centers (KTH Royal Institute of Technology, Stockholm, Sweden). An additional goal will be to determine the thermal properties of the resulting solid electrolytes and characterize their phase transitions, with particular emphasis on the reversible gel-sol-gel phase transition. The most promising systems, in terms of chemical composition and supramolecular structure, will be subjected to performance testing to determine their application potential.

IV. Responsibilities

- Conducting experimental research:
  - Material synthesis, including designing and carrying out sample production processes.
  - Microstructural, thermal, mechanical and spectroscopic analysis of materials using advanced methods (e.g. TGA, DSC, NMR, POM, SEM, SFCM).
  - Measurement and evaluation of electrochemical properties of the produced materials.
- Development of theoretical models and data analysis
  - Determination of the mechanisms of ionic conduction, intermolecular interactions and their influence on the electrochemical properties of membranes.
  - Analysis of the obtained results in order to identify key parameters responsible for the efficiency and renewability of the produced membranes.
- Collaboration with the project team
  - Participation in regular meetings of the research team.
  - Collaboration with other project participants, including exchange of knowledge and research results.
- Scientific publications and presentations
  - Preparation of scientific publications in reputable international journals.
  - Presentation of research results at scientific conferences at home and abroad.
- Development of research skills
  - Expanding knowledge in the field of supramolecular materials, electrochemical energy source technologies and research methods.
  - Participation in trainings, workshops and courses related to the project topics.

- Support in the organization of project activities
    - Assist in the preparation of project reports.
    - Support in obtaining necessary materials and research tools.

V. Job benefits

- The work will be carried out in close cooperation with the Center of Advanced Technologies of Adam Mickiewicz University in Poznań and the Royal Institute of Technology in Stockholm.
- The project provides the opportunity to participate in international conferences.
- The project offers the opportunity to complete a research internship at the Royal Institute of Technology in Stockholm, Sweden.

VI. Additional information

1. As part of the project, the Ph.D. student will receive a doctoral scholarship in the amount of PLN 4,880.70 net (PLN 5,500.00 gross) till the month of mid-term assessment and for the next 18 months, in the amount of PLN 5,768.10 net (PLN 6,500.00 gross). The period of receiving the scholarship is 36 months.
2. The Ph.D. student will be covered with the costs of social insurance, pursuant to Article 6(1)(7b) and Article 12(1) of the Act of October 13th, 1998 on the social insurance system (Journal of Laws of 2019, item 300, as amended), in accordance with the principles described below:
    a. Social security contributions are co-financed by the Ph.D. student (insured) and the Institute of Molecular Physics of the Polish Academy of Sciences (payer).
    b. The pension insurance contribution is financed in equal parts by the insured and the payer from their own resources, 9.76% of the calculation base each.
    c. The disability pension insurance premium is financed by the insured person in the amount of 1.5% of the calculation base and 6.5% of the calculation base of the payer.
    d. The sickness insurance contribution is financed entirely by the insured person from his own resources.
    e. The accident insurance contribution for doctoral students is financed entirely from the payer's own funds.

VII. Requirements for candidates

1. M.Sc. degree in physics or related sciences, or fulfilling the conditions stipulated in article 186, section 2 of the act of July 20th, 2018 Law on Higher Education and Sciences (journal of Laws of 2018, item 1668, as emended).
2. A person not holding the qualifications described in paragraph 1 may take part in a competition, but must obtain those qualifications before commencing study at Poznan Doctoral School of the Institutes of the Polish Academy of Sciences.
3. Knowledge and experience in the field of solid state physics.
4. Ability to use programs supporting research, for example: Mathematica, Origin, MS Office, etc.
5. Fluency in English (both in speech and writing) on the level of B2-C2.
6. The ability to independently solve problems as well as to work in a group, commitment and positive motivation.
7. An additional advantage will be the expanded knowledge of the subject of magnetic materials and related experimental methods.

VIII. Required documents

1. Application for admission to Poznań Doctoral School of the Institutes of the Polish Academy of Sciences (PDS IPAS) along with the consent for processing personal data upon the recruitment

procedure and a statement on having acknowledged the regulations of recruitment for PDS IPAS, using form downloaded from: https://www.ifmpan.poznan.pl/BIP/edukacja/psd-ipan.html?task=article.downloadAttachment&id=946&version=1289

2. Certified copy of the diploma confirming graduation or a certificate confirming graduation (in the case of diplomas issued by foreign higher education schools, diploma stipulated in article 326, section 2, passage 2 or article 327, passage 2 of the act of July 20th, 2018 – Law on Higher Education and Science (Journal of Laws of 2018, item 1668, as amended), entitling to apply for conferment of a doctoral degree in the state in where such a certificate was issued by the relevant higher education school. In the event when the candidate does not have the aforementioned documents, he/she is obliged to submit them before admission to PDS IPAS. Additional information on foreign school diplomas is available at: https://nawa.gov.pl/en/recognition/recognition-for-academic-purposes/applying-for-admission-to-doctoralstudies;
3. Scientific CV encompassing track record of previous education and employment;
4. A cover letter featuring a short description of research interests, scientific accomplishments, a list of publications, information on involvement in scientific activity (membership of student scientific groups, participation in scientific conferences, completed internships and training courses, prizes and distinctions received) and reasons for wishing to study at the doctoral school;
5. Certificates or other documents confirming the degree of proficiency in English, if the candidate owns such materials;
6. Consent for the processing of personal data for recruitment purposes (Appendix 1);
7. Contact details of at least one previous scientific supervisor or another researcher who is entitled to issue an opinion on the candidate.

Documents in other languages than Polish or English should be translated into polish or English.

Applications should be submitted electronically on e-mail address office@ifmpan.poznan.pl with the subject of the message "*Competition for the Ph.D. position No. 21/2025/IFM/PSD"* as the attachment in the pdf file format.
Alternatively, if the electronic delivery is not possible, applications can be sent to the postal address: Secretariat of the Institute of Molecular Physics, Polish Academy of Sciences, Mariana Smoluchowskiego 17, 60-179 Poznan, Poland, with an annotation on the envelope: " *Competition for the Ph.D. position No. 21/2025/IFM/PSD"*.

Please do not send the originals of the documents.

IX. Recruitment Procedure

Recruitment will take place in accordance with the Recruitment Regulations for PDS IPAS. The highest-ranking candidates will be invited to an interview (in a hybrid form: on-line or on-site). The candidates will be informed at least 7 days before the planned interview.

X. Criteria for evaluation of candidates for the position of doctoral student in the Opus-28 project.

The scholarship will be awarded in accordance with NCN regulations. The committee will take into account the following criteria:

- the candidate's scientific achievements, including publications in reputable scientific publications/journals (50% of the final grade);

- achievements resulting from scientific research, fellowships, awards, and scientific experience gained at home or abroad, scientific workshops and training, participation in research projects (20% of the final evaluation);
- competence to carry out specific tasks in a research project (30% of the final evaluation).

The scholarship will be awarded to the person who obtains the highest number of points. If the best candidate does not sign the contract, due to resignation, we reserve the right to select the next candidate from the ranking list.

XI. Criteria for evaluation of candidates for Doctoral School

1. Candidate's research achievements, according to the grades obtained in the course of studies, scientific publications, awarded scholarships, and distinctions resulting from conducting scientific research or student activities or other achievements;
2. Candidate's scientific and professional experience, according to participation in conferences, workshops, training sessions and internships, implementation of research and commercial projects, involvement in scientific trusts and societies, international and professional mobility, experience in other sectors, including industry;
3. Candidate's knowledge of the following discipline: physical sciences;
4. Knowledge and experience in the subject matter described in the recruitment advertisement.

The recruitment procedure shall be concluded until 31 October, 2025.
Estimated scholarship start date: 3 November, 2025.

The description of the recruitment process for Doctoral School is stipulated in the Regulations of Recruitment for PDS IPAS. Following the recruitment procedure, the unadmitted candidates shall be informed on the strong and weak sides of their applications. The recruitment results are public.

For additional information, please contact:
the Principal Investigator of the OPUS-28 project, dr hab. inż. Michał Bielejewski, prof. IMP PAS
e-mail: bielejewski@ifmpan.poznan.pl
tel.: +48 (0)61 8695 210

Institute of Molecular of the Physics Polish Academy of Sciences does not provide accommodation.

PROJECT LEADER	DIRECTOR
prof. dr hab Tomasz Toliński	**prof. dr. hab. Zbigniew Trybuła**

Information clause:

According to the content of art. 13 of Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of individuals with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46 / EC (General Data Protection Regulation), hereinafter referred to as GDPR, we inform that:

1. The administrator of the collected personal data is the Institute of Molecular Physics of the Polish Academy of Sciences, Mariana Smoluchowskiego 17, 60-179 Poznan, Poland, VAT No. PL 777-00-20-870 (hereinafter referred to as the Institute).
2. The administrator has appointed a Data Protection Inspector who can be contacted in writing, by traditional mail, writing to the Institute's address: Data Protection Inspector, Institute of Molecular Physics of the Polish Academy of Sciences, Mariana Smoluchowskiego 17, 60-179 Poznan, Poland or by sending an e-mail to iod@ifmpan.poznan.pl.
3. Personal data are processed to implement the administrator's tasks related to the recruitment to the Poznań Doctoral School of the Institutes of the Polish Academy of Sciences.
4. The legal basis for data processing is the Act of 26 June 1974 - Labor Code, the Act of 30 April 2010 on the Polish Academy of Sciences, the Act of 20 July 2018 Law on Higher Education and Science, and consent of the data subject.
5. Personal data collected in the current recruitment process will be stored for three months from the moment the recruitment process is resolved. After this period, personal data will be effectively destroyed.
6. Personal data will not be conveyed to a third country.
7. Personal data of the candidate selected in the competition may be made available to third parties authorized under the law.
8. The person whose data is processed has the right to:
- access to the content of your personal data, demand their correction or deletion, on the terms set out in art. 15-17 GDPR;
- set restrictions on data processing, in cases specified in art. 18 GDPR;
- data transfer, on the principles set out in art. 20 GDPR;
- withdrawal of consent at any time without affecting the lawfulness of the processing that was carried out based on consent before its withdrawal;
- lodging a complaint to the President of the Office for Personal Data Protection.

Providing personal data in the scope resulting from art. 22 (1) of the Act of 26 June 1974 - Labor Code, is mandatory, providing data in a broader scope is voluntary and requires consent to their processing. Refusal to provide personal data prevents the application from being considered.

Appendix 1

Consent for the processing of personal data for recruitment purposes

I agree to the processing of personal data provided in this document for realising the recruitment process pursuant to the Personal Data Protection Act of 10 May 2018 (Journal of Laws 2018, item 1000) and in agreement with Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation).

Name ……..

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Date and signature