Szkoła Doktorska Instytutu Niskich Temperatur i Badań Strukturalnych PAN
ul. Okólna 2, 50-422 Wrocław

Doctoral School of Institute of Low Temperature and Structure Research, PAS
Okólna St. 2, 50-422 Wrocław, Poland

Special Recruitment to the Doctoral School of ILT&SR PAS in the Division of Nanomaterials Chemistry and Catalysis for PhD Student – Scholarship holder in the Research project SONATA 19 (NCN)

Institution: Doctoral School of ILT&SR PAS,

Institute of Low Temperature and Structural Research, Polish Academy of Sciences

Position: PhD student – scholarship holder in the NCN research project (M/F)

Scientific discipline: Chemical Sciences

Date of announcement: 30.01.2026

Application deadline: 20.02.2026

Date of competition settlement: Recruitment results will be announced within 7 days after the end of the interviews.

Planned date of commencement of education and participation in the project: 01.04.2026

Link to DS of ILT&SR PAS website: https://phd.intibs.pl/en/

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Keywords: heterogeneous catalysis, hierarchical catalysts, carbon dioxide hydrogenation, smart nanomaterials, thermally-programmed methods, electron microscopy (TEM, SEM), *in situ/operando* methods

Doctoral School of Institute of Low Temperature and Structure Research of the Polish Academy of Sciences (DS of ILT&SR PAS) announces a special recruitment for a PhD student – scholarship holder (M/F) in the research project: "Smart multicomponent catalysts for CO_2 valorization", carried out on behalf of the National Science Center SONATA 19 (grant no. 2023/51/D/ST4/00339) in the Division of Nanomaterials Chemistry and Catalysis of the Institute of Low Temperature and Structure Research of Polish Academy of Sciences in Wroclaw.

Recruitment is conducted in accordance with the Rules of Recruitment to the Doctoral School of ILT&SR PAS

https://phd.intibs.pl/files/dokumenty_EN/25-04-29-Zasady_rekrutacji_SD_INTiBS_PAN_en.pdf

Requirements for the candidate

The application should include a filled application form at the link https://phd.intibs.pl/en/recruitment.html and presented in Polish or English:

- diplomas: matriculation or higher secondary school certificate, Bachelor's (engineering), Master's Degree diploma in chemistry, Physics, material engineering or related disciplines or an equivalent certificate of graduation or an official document from the applicant's (M/F) university stating when the M.Sc. defense is due. The diploma should be provided before taking the oath (the commencement of education), [in the case of candidates who do not meet this condition: (1) a copy of the diploma of completion of first-cycle or third-year master's degree studies and (2) an application to the School Council for admission to recruitment, including a description of proven scientific achievement of the highest quality],

  In the case of obtaining a professional title M.Sc. outside the European Union - additionally originals of M.Sc. diploma and its transcript with grades, both certified with an apostille or authenticating (legalization) in the diplomatic representation of the Republic of Poland (in that country). Documents submitted without proper authentication will be considered as not meeting formal requirements.
- a duplicate (certified copy) of the entire grade book/Transcript of Records of the first- and second-cycle program (or full-cycle Master's degree program), or a supplement to the degree with grades from the entire course of study, or a student's (M/F) grading report from all years of their studies confirmed by the Dean's Office, together with the calculated average grade from their studies;
- a certificate of English-language skills at B2 level or higher or information in the diploma supplement that the candidate completed an English course at the required level as part of the university program (if the supplement does not describe the level of the course, a certificate from the Dean's Office is required;
- a cover letter with an indication of the research topics within the framework of the research project;
- additional documents proving the candidate's suitability for scientific work (list of publications and conference presentations, list of completed courses and postgraduate studies, obtained language certificates, activity in scientific circles, etc.).

Doctoral Student Responsibilities

1. Implementation of an individual research plan, consistent with the research project;
2. Synthesis of hierarchical catalysts with designed morphology and structure;
3. Comprehensive characterization of synthesized materials using *ex situ* and *in situ/operando* methods;
4. Analysis and interpretation of obtained data;
5. Preparing reports and publications in collaboration with other members of the research team;
6. Presenting the results at scientific conferences

Scholarship

The doctoral scholarship will be paid a maximum of 4 years in the monthly amount of:

- 5,000 PLN (the amount will be reduced by the cost of mandatory social security contributions, etc., about 24%) until the month in which the doctoral student's mid-term evaluation at the doctoral school was conducted

- not lower than specified in the Law on Higher Education and Science and applicable executive regulations the amount will be reduced by the cost of mandatory social security contributions, etc., about 11%) after the month in which the student's mid-term evaluation at doctoral school was conducted

The scholarship will be paid after deduction of all components, in accordance with the applicable regulations and in accordance with the Act of 20 July 2018 Law on Higher Education and Science (Journal of Laws of 2024.10.24; 1571).

Joining the competition

Candidates wishing to enter the competition should submit all documents specified in the Rules of Recruitment to the Doctoral School of Institute of Low Temperature and Structure Research of the Polish Academy of Sciences.

https://phd.intibs.pl/files/dokumenty_EN/25-04-29-Zasady_rekrutacji_SD_INTiBS_PAN_en.pdf

Candidates' applications for admission to the School must be submitted by 20.02.2026

a) by email to the address phd@intibs.pl (preferred method of application); however, the original documents should be delivered before the studies start (a failure to meet this requirement will result in the candidate's name being removed from the list of doctoral students),

b) in person at the School's Secretariat Office at the Institute of Low Temperature and Structure Research of the Polish Academy of Sciences, 2 Okólna St. in Wrocław, from 9 am to 3 pm.

Description of the research project and the PhD thesis

Supervisor: prof. dr hab. Leszek Kępiński
Auxiliary supervisor: dr inż. Karolina Ledwa

The proposed doctoral project addresses the pressing global issue of mitigating atmospheric CO_2 concentrations, focusing on its thermochemical conversion to valuable chemicals such as alcohols or hydrocarbons. Given the inherent thermodynamic stability of CO_2 and the persistent limitations of current catalytic systems (including poor selectivity and rapid deactivation) the development of efficient, selective, and stable catalysts remains a major scientific and technological challenge.

The central aim of the project is to design and synthesize a new generation of nanostructured heterogeneous catalysts featuring a hierarchical architecture, tailored explicitly for CO_2 hydrogenation. These catalysts will be based on alumina supports with controlled morphology, grafted with ceria nanoparticles doped with catalytically active metals. The chemical composition, size, and distribution of the active phase particles on the support will be meticulously engineered to optimize the catalysts' activity, selectivity, and long-term stability. A key innovation lies in the incorporation of self-regenerative functionalities within the active phase, which are expected to enhance catalyst durability under reaction conditions.

To elucidate structure–activity relationships, the obtained materials will be in-depth characterized using advanced techniques, including powder X-ray diffraction, transmission and scanning electron microscopy, photoelectron spectroscopy, X-ray absorption spectroscopy,

infrared spectroscopy, Raman spectroscopy, and gas adsorption-based methods. Particular emphasis will be placed on the use of *in situ/operando* techniques (e.g., *in situ* DRIFTS, *in situ* TEM), which enable the monitoring of the structural and chemical evolution of catalysts under real reaction conditions.

Additional information

For additional information, please contact the project manager Dr. Karolina Ledwa (e-mail: k.ledwa@intibs.pl).

Personal information

Candidates' personal data are collected and processed by the Institute of Low Temperature and Structure Research of Polish Academy of Sciences in Wrocław in accordance with the information on personal data processing available at https://bip.intibs.pl/artykuly/rodo-1