

Job details

Place of work

Institute of Physical Chemistry, Polish Academy of Sciences

Funding institution

National Science Centre (NSC)

Project description

Project title, type and project number

Nanoengineering of multicomponent metal-free carbonaceous materials for bio-oil upgrading through ultrasound-assisted selective redox photo-catalysis in continuous-flow reactors.

OPUS 20, Project nr 2020/39/B/ST5/00076

Project leader

dr hab. inż. Juan Carlos Colmenares Q. prof. IChF-PAN

Description (informal inquiries should be directed to dr hab. inż. Juan Carlos Colmenares Q. prof. IChF-PAN, email: jcarloscolmenares@ichf.edu.pl)

This project aims to develop a novel method for the transformation of lignin and chitosan into valuable metal-free nitrogen(N)- and/or sulphur(S)-containing carbonaceous photocatalysts. New catalytic materials possessing excellent sonophotocatalytic redox properties to assist continuous flow photo-redox processes in obtaining high-value chemicals from bio-oil-based molecules upgrading. The objective is to prepare metal-free carbon-based photocatalytic materials through the physicochemical effects of low/high-frequency sonication (e.g., effective mass transfer, microstreaming, cross-linked radical polymerization, etc, effects often inaccessible through conventional methods) as a promising pre-treatment step before ending the synthesis of the materials under hydro(solvo)thermal conditions. It will be carried out the study of the physicochemical properties of carbon-based materials (before and after (sono)-(photo)-catalytic test reactions), and testing them in the selective sonophotocatalytic oxidation and C-C sonophoto-reductive coupling of bio-oil-inspired model compounds (in flow liquid-phase) as a futuristic approach of bio-oil-based molecules valorization. Systematic basic research of the effect of green and unconventional source of ultrasonic energy on the pre-treatment of chitosan (precursor of C, N, O) and lignin (precursor of C, S, O, aromaticity) and its effect on the final material obtained after optimization of hydro(solvo)thermal conditions, will be carried out. To get insight into the mechanism of ultrasound-assisted hydro(solvo)thermal method, the whole spectrum of materials characterization techniques and basic kinetic studies and photocatalysts' stability/recycling studies (using the appropriate flow (sono)-(photo)-reactors) will be carried out. The use of ultrasound-based procedures offer a facile, versatile synthetic tool for the preparation of nanophotocatalysts, often inaccessible through conventional methods. <https://www.ncn.gov.pl/sites/default/files/listy-rankingowe/2020-09-30apsv2/streszczenia/497947-en.pdf>

Job description

Number of vacancies

Key responsibilities include

- Planning and performing experiments
- Data analysis
- Reporting
- Preparation of scientific publications as well as presentations of the results at scientific and popular science conferences.
- Cooperation with team members

Position in the project

Ph.D. Student

Job type

Doctoral Stipend

Salary

We offer highly competitive Ph.D. Polish stipend of approx. 5000 PLN per month „Stypendium doktoranckie” (which correspond to a good standard of living in Poland) funded by the NCN OPUS-20 Project No. 2020/39/B/ST5/00076. The position is scheduled for a period of 48 months.

Position starts on

February-March of 2022

Maximum planned period of contract/stipend agreement

48 months

We offer

Work in a young and dynamic team (<https://photo-catalysis.org>); well-equipped laboratories of the Institute of Physical Chemistry and research center in Greece (project partner); large autonomy during the execution of tasks; the possibility of publishing articles in worldwide prestigious journals and participation in international conferences; the possibility of preparing a doctoral dissertation; ERASMUS+.

Requirements for applicants (recruitment takes place through the Doctoral School for the project title: *Nanoengineering of multicomponent metal-free carbonaceous materials for bio-oil upgrading through ultrasound-assisted selective redox photo-catalysis in continuous-flow reactors*):

Expertise sought from a Ph.D. student: Graduates of chemistry, physics, materials science, and related university faculties, holding a Master of Science or equivalent degree (obtained recently, approx. < 3 years before starting this project) with an aptitude and passion for natural and exact sciences, with good knowledge of English and outstanding motivation and open mind for

interdisciplinary research at the border of chemistry-physics are invited to join this project research group. Additionally:

1. CV
2. Copy of MSc diploma
3. Distinctions granted by virtue of scientific research, grants, awards and scientific experience acquired outside your own research work place in the country or abroad; participation in workshops and scientific trainings; participation in research projects.
4. Experience in conducting scientific research in the field of catalysis, organic synthesis and materials characterization.
5. At least the opinions of two independent research scientists, specialists in the field of chemistry and related sciences.
6. Very welcome are publications in reputable publishing houses / scientific journals.

Scientific discipline

Chemistry, Physics, Catalysis, Material Engineering or related sciences

Scientific profile of a candidate

First Stage Researcher (R1)

Very Important Information about „How to Apply” (recruitment takes place through the Doctoral School for the project title: *Nanoengineering of multicomponent metal-free carbonaceous materials for bio-oil upgrading through ultrasound-assisted selective redox photo-catalysis in continuous-flow reactors*):

The whole information about expectations from the candidates, assessment criteria, complete list of required documents and recruitment procedure will be at:

Warsaw PhD School in Natural and BioMedical Sciences:

<https://warsaw4phd.eu/en/admissions/>

Recruitment dates: <https://warsaw4phd.eu/en/admissions/>

Dates of recruitment interviews for candidates: <https://warsaw4phd.eu/en/admissions/>



By submitting the application you consent to the processing of your personal data in the recruitment process.

The controller of your personal data is the Institute of Physical Chemistry of the Polish Academy of Sciences with its registered office in Warsaw, NIP: 5250008755 (the "Institute"). The Institute will process your data for the purpose of carrying out scientific and research activities, providing services and contact with the Institute, on the basis of a contract (in connection with the performance of the contract or in order to take action on your request before the contract is concluded - Article 6, paragraph 1, letter b) of GDPR), the legitimate interest of the Institute (Article 6, paragraph 1, letter f) of the GDPR) and legal provisions (Article 6, paragraph 1, letter c) of the GDPR) - depending on the circumstances.

You have the right to: request access to your data, receive a copy of it; rectify (correct) it; delete it; limit its processing; transfer it; lodge a complaint to the supervisory body; withdraw your consent for processing at any time (withdrawal of consent does not affect the lawfulness of the processing carried out prior to its withdrawal) or to lodge an objection to data processing. More information is available on the Institute's website.

https://ichf.edu.pl/theme/ichf/pliki/RODO_kluczula_informacyjna.pdf