

**Recruitment for the Poznań Doctoral School of the Institutes of the Polish Academy of Sciences
at the Institute of Bioorganic Chemistry, PAS in Poznań
Procedure no. 43/2022/ICHB/PSD**

INSTITUTION: Institute of Bioorganic Chemistry, PAS
CITY: Poznań
POSITION: PhD student
POSITIONS AVAILABLE: 1
SCIENTIFIC DISCIPLINE: chemical sciences
PUBLICATION DATE: 13.10.2022
APPLICATION DEADLINE: 14.11.2022 r.
IBCH PAS WEBSITE: <http://www.ibch.poznan.pl>
PDS IPAS WEBSITE: <http://www.psd-ipan.ibch.poznan.pl/>

KEY WORDS: NMR spectroscopy, nucleic acids, modified RNA units

Research topic: "Synthesis and structural/biophysical studies of model mRNA/mt-tRNA oligomers to evaluate the role of modified nucleosides (m5C, hm5C, f5C, ca5C, m1G) in translation and human diseases"

Principal Investigator: dr Witold Andrałojć

I. Project description

Modified nucleosides present in mRNA and tRNA are important elements of the cellular machinery responsible for effective and accurate protein biosynthesis. The major players of this machinery are modified nucleosides located at the coding region of mRNAs and the anticodon stem-loop domain (ASL) of cytosolic and mitochondrial (mt) tRNAs, directly attending the codon-anticodon interactions on the ribosome. Since mitochondria produce ~90% of the energy required by the cell, the structural perturbation of mt-tRNAs were found to cause several human diseases (e.g. MERRF, MELAS, LHON). In contrast to tRNAs, mRNA molecules contain a rather small number of modifications, but their importance in the regulation of cellular processes has been clearly demonstrated. Some of them, called epigenetic, were recently discovered to be dynamic and can play a critical regulatory role in protein biosynthesis. Within the scope of the current project, we focus on two complex problems addressing the role of mRNA and mt-tRNA modifications in translation process. The first subject of our interest is epigenetic modifications derived from 5-methylcytidine: 5-hydroxymethylcytidine (hm5C), 5-formylcytidine (f5C) and 5-carboxycytidine (ca5C) identified in coding region of mRNA. It has been suggested that they play a regulatory role in the translation at the mRNA level, but there is no systematic research to date. Within the Project, we plan to perform the biophysical and structural characterization of suitably modified oligonucleotides to evaluate the impact of structurally distinct epigenetic cytidines on RNA properties and functionality. The second goal of our Project concerns two pathogenic nucleosides identified at the position 37 of mt-tRNA^{Met}, resulting from mutation A4435→G in human mt-DNA and subsequent enzymatic methylation G37→m1G37. Both pathogenic mutations cause severe mitochondrial dysfunction in some patients associated with hypertension, type 2 diabetes or Leber's hereditary optic neuropathy (LHON). Recently, we have proved that the replacement of conserved A37 to G37 and next to m1G37 alters the thermal stability of ASL hairpin motif, particularly in the case of G37-containing ASL, which was predicted to form a super-stable tetraloop hairpin [Chem. Commun., 2021, 57, 12540]. Within the project we plan to use appropriate oligonucleotide models for biochemical and structural studies to assess the properties of damaged hmt-ASL^{Met} molecules.

The project is realized in a consortium with Łódź University of Technology (leader). The research tasks performed at IBCh will concentrate on high-resolution characterisation of the studied systems using NMR spectroscopy methods, complemented by UV and CD spectroscopies, as well as electrophoretic methods.

Additional information:

1. Research and doctoral theses shall be carried out within the project OPUS 22 no. 2021/43/B/ST4/01570), entitled “*Synthesis and structural/biophysical studies of model mRNA/mt-tRNA oligomers to evaluate the role of modified nucleosides (m5C, hm5C, f5C, ca5C, m1G) in translation and human diseases*”, funded by the National Science Centre.
2. PhD students shall receive a stipend in the gross amount of ca 4300 PLN (3800 PLN net), for the period of 42 months with possible extension
3. PhD students shall be subject to social insurance, pursuant to article. 6 section 1 passage 7b of the act of October 13th, 1998 on the social insurance system (Journal of Laws of 2019, item 300, 303 and 730).

II. Requirements for the candidates:

1. A M.Sc. or equivalent experience in chemistry, physics or biology
2. University level knowledge of spectroscopic methods (NMR, CD, UV) and organic chemistry, preferentially some experience in these fields
3. Ability to work independently, plan and conduct experiments, analyze results
4. Written and oral English proficiency
5. Motivation and a willingness to further scientific development, good communication skills and teamwork abilities

III. Duties in the project:

1. The PhD student will be involved primarily in the spectroscopic branch of the project. The PhD student will be involved in NMR spectra acquisition and resonance assignment. The student will also apply complementary techniques, such as UV spectroscopy or gel electrophoresis, when needed. Moreover, the student will also be involved in large scale DNA/RNA synthesis (on a DNA/RNA synthesizer) and purification (using a variety of methods including preparatory HPLC).
2. Participation in the preparation of publications.
3. Participation in experimental data storage and management.

IV. Required documents:

1. Application for admission to 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.ibch.poznan.pl/uploads/studium%20doktoranckie/2019/ICHB%20-%20Application%20for%20admission%20\(2019-09\).docx](https://www.ibch.poznan.pl/uploads/studium%20doktoranckie/2019/ICHB%20-%20Application%20for%20admission%20(2019-09).docx)
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 is not in possession of the aforementioned documents, he/she is obliged to submit them prior to admission to PDS IPAS. Additional information on foreign school diplomas are available at: <https://nawa.gov.pl/en/recognition/recognition-for-academic-purposes/applying-for-admission-to-doctoral-studies>
3. Scientific CV encompassing track record of previous education and employment, information on involvement in scientific activities (participation in student research groups, attendance at scientific conferences, accomplished internships and training, awarded prizes and distinction) and list of publications.
4. Cover letter featuring a short description of research interests, achievements and justification for the intention to commence education at the doctoral school.
5. Certificates or other documents confirming the degree of proficiency in English, if the candidate is in possession of such materials.
6. Contact details of at least one, previous scientific supervisor or another researcher who is entitled to issue an opinion on the candidate.

V. Applications should be submitted via the eRecruiter portal at

<https://system.erecruiter.pl/FormTemplates/RecruitmentForm.aspx?WebID=c1d9af0eac3443dabd055ae839860652>

VI. Submission deadline is **14.11.2022**.

VII. Criteria for evaluation of candidates:

1. Candidate's research achievements, pursuant 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, pursuant 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 on the following discipline: chemical sciences.
4. Knowledge of the subject matter described in the recruitment advertisement.

VIII. The recruitment procedure shall be concluded no later than **14.12.2022**.

IX. The description of the recruitment process is stipulated in the Regulations of Recruitment for PDS IPAS. Following the recruitment procedure, the unadmitted candidates shall be informed on the number of points obtained at both stages.

Incomplete applications will not be considered.

For additional information please contact the Principal Investigator:

dr Witold Andrałojć

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Information clause:

Pursuant to the stipulations of the 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), further referred to as GDPR, we hereby inform that:

- *The Institute of Bioorganic Chemistry, Polish Academy of Sciences, seated in Noskowskiego St. 12/14, 61-704 Poznan; REGON 000849327, NIP 777-00-02-062 is the administrator of the collected personal data (further referred to as the Institute).*
- *The Administrator appointed a Data Protection Officer, who can be contacted in writing, via traditional mail, by sending a letter to the following address: Z. Noskowskiego St. 12/14, 61-704 Poznan, or by sending an e-mail to: dpo@ibch.poznan.pl.*
- *The personal data of the candidates is processed for the purposes of fulfilling the tasks of the administrator, associated with conducting the recruitment procedure for a vacant position.*
- *The legal basis for processing personal data is the Act of 26 June 1974 – The Labor Code, Act of 30 April 2010 on the Polish Academy of Sciences or the consent of the person whose data shall be subjected to processing.*
- *Your personal data shall be subjected to processing for period of 3 months upon the date of decision of the recruitment committee. Following this period, the data will be irretrievably and effectively destroyed.*
- *The personal data of the candidates shall not be transferred to any third country.*
- *The person whose data shall be subjected to processing has the right to:*
 - *request access to his/her personal data, and to amend it or delete it, pursuant to articles 15-17 of GDPR;*
 - *limit data processing, in the events stipulated in article 18 of GDPR;*
 - *data transferring, pursuant to article 20 of GDPR;*

- *withdraw consent at any moment, without influencing compliance with the law of the processing that was executed prior to consent withdrawal;*
- *file a complaint to the Inspector General for Personal Data Protection.*

Providing personal data in the scope stipulated in article 22 (1) of the Act of 26 June 1974 – The Labor Code is mandatory, whereas providing data in a broader scope is voluntary and requires consent for its processing.