INSTITUTE OF BIOORGANIC CHEMISTRY
Polish Academy of Sciences

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Recruitment for the Poznań Doctoral School of the Institutes of the Polish Academy of Sciences at the Institute of Bioorganic Chemistry, PAS in Poznan
Procedure no. 29/2022/ICHB/PSD

INSTITUTION:	Institute of Bioorganic Chemistry, PAS
CITY:	Poznan
POSITION:	PhD student
POSITIONS AVAILABLE:	1
SCIENTIFIC DISCIPLINE:	chemical sciences
PUBLICATION DATE:	13.07.2022 r.
APPLICATION DEADLINE:	28.08.2022 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, paramagnetic effects

Research topic: "Lanthanide binding oligonucleotides (LBOs) as paramagnetic tags for NMR spectroscopy of nucleic acids"
Principal Investigator: dr Witold Andrałojć

I. Project description

Biomolecular NMR spectroscopy is one of the most accomplished and widely used methods in high resolution structural biology and its methodological arsenal is still being actively expanded. One branch of methodologies finding increasing application in the biomolecular NMR community is a family of techniques known under the common name of "paramagnetic biomolecular NMR". The great appeal of paramagnetic effects in NMR spectroscopy stems from their inherent long-range nature (> 30 Å), which allows to translate them into extremely long-range structural restraints. Over the last two decades these "paramagnetic restraints" have been applied to great effect in the field of protein NMR. In a stark contrast, the paramagnetic effects – with the exception of Paramagnetic Relaxation Enhancements (PRE) – have, thus far, found almost no application in the field of NMR studies of nucleic acids. This situation is caused by the lack of reliable techniques for introducing paramagnetic centers into this type of biomolecules. The objective of the current proposal is the development and testing of lanthanide binding oligonucleotides (LBOs) – a direct counterpart of lanthanide binding peptides used to great effect in NMR spectroscopy of proteins – as a general method of paramagnetic tagging of nucleic acid systems.
The development of LBOs will be based on three families of tightly lanthanide-binding DNA molecules previously reported in the literature. The original systems are several times too large to be practically useful as paramagnetic tags and concurrently none of them have been structurally characterized. The main objective of the current project is to thoroughly structurally characterize the three known families of lanthanide binding DNAs (preferentially by solving their 3D structures in solution), identify the exact position and geometry of each lanthanide binding site and then use this knowledge to extract what may be called the "minimal lanthanide binding DNA sequences" for each family. As the final step of the project these sequences will then be "implanted" at carefully selected positions into various "host" DNA and RNA molecules to test their capability to induce paramagnetic effects in these hosts and thus serve to as LBOs for paramagnetic NMR.
If successful, the proposed research will provide a new, much desired tool for NMR spectroscopists, hopefully meaningfully expanding capacities of nucleic acid NMR towards dealing with more complex systems and addressing more sophisticated structural and dynamic inquiries.
The main techniques to be used in the scope of the project are biomolecular NMR spectroscopy (including paramagnetic effects), molecular dynamics protocols for structure calculations and chemical synthesis of nucleic acids on solid support as the source of samples. Other biophysical techniques (like UV an CD spectroscopies and gel electrophoresis) will also be used as supporting experiments.

Additional information:

1. Research and doctoral theses shall be carried out within the project OPUS 19 no. 2020/37/B/ST4/03182, entitled *"Lanthanide binding oligonucleotides (LBOs) as paramagnetic tags for NMR spectroscopy of nucleic acids"*, 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 30 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 in both the chemical and spectroscopic branches of the project (emphasis may shift to one or the other depending on the student's background and proficiencies). Within the former branch his/her involvement will include performing large scale DNA/RNA synthesis (on a DNA/RNA synthesizer) and purification (using a variety of methods including preparatory HPLC). Within the latter branch 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.
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
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=15f9554c9f134d6ca9f603e812328f93

VI. Submission deadline is **28.08.2022.**

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 **27.09.2022.**

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:
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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.