DC7: Dynamic combinatorial oligonucleotides libraries

Host institution: University of Southampton, School of Chemistry and Chemical Engineering, Southampton, UK.

Supervisor: Prof. Eugen Stulz

Co-Supervisors: Prof. Barbara Uszczynska-Ratajczak, Institute of Bioorganic Chemistry, Polish Academy of Sciences (Academic); Dr. Thomas Frischmuth, baseclick GmbH (Industrial).

Project description: Dynamic combinatorial chemistry is emerging as a valuable tool in drug discovery, where suitable precursors are selected and amplified from a pool of interchanging molecules. The pool is based on the reversibility of selected chemical reactions, giving access to a large and diverse library from which the target template will select and amplify the best binder (for a recent review see here). This unique system will be extended to oligonucleotides, where we will develop the chemistries necessary to create dynamic combinatorial libraries of oligonucleotides (DCL ONs) which will respond to suitable templating. The project will include high level organic chemistry for the synthesis of tailored nucleoside analogues, together with the development of analytical tools to study the system's behaviour, which will be based on mass spectrometry and spectroscopy. Applications in sequencing, sensing and aptamer formation (targeting) will be pursued, leading to entirely novel systems for biotechnology.

Host laboratory: The research activities in the group of Prof. Stulz are focused on the synthesis of DNA, their modification, and subsequent study of the effects on biological systems, as well as applications in bio-nanotechnology. The group has full access to state-of-the-art laboratories for synthesis and handling of DNA including chemical modification, purification and analysis (HPLC, UV-vis, fluorescence, CD spectroscopy, MS). Biological studies (cell viability using flow cytometry, imaging using confocal microscopy, cell transfection etc) are performed with the partners in the network.

Secondments: This project is carried out in strong collaboration with the following groups, and visits to their laboratories are expected during the project. A willingness to travel and spend time abroad is therefore essential:

- Dr. Thomas Frischmuth, baseclick GmbH, Germany;
- Prof. Barbara Uszczynska-Ratajczak, Institute of Bioorganic Chemistry, Polish Academy of Sciences, Poland;
- Prof. Charles Lawrie, IIS Biogipuzkoa Health Research Centre, Spain.

Eligibility conditions:

- A Master's degree in Chemistry, Chemical Biology or a related field.

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Required Skills:

- Research experience (e.g. through Master thesis work or research internships) in organic synthesis and in handling and analysis of biomolecules (DNA, proteins) is essential. Basic knowledge in analytical techniques related to DNA will be a strong advantage.
- Proficiency in the English language is required, as well as good communication skills, both oral and written. Successful candidates will need to provide an English test (e.g. IELTS, TOEFL, Cambridge English);); see here for details of accepted English Language Proficiency tests and results at Southampton. For students requiring a visa to study in the UK, the IELTS test is mandatory. You may be exempt if you are a national of a majority native-English speaking country, or have qualifications / degree that has been taught and assessed in English.

Enquiries

For general information about the INT2ACT Doctoral Network visit the visit the project website (www.int2act.eu) or send an email to int2act@gmail.com.
For additional information on this project please contact Prof. Eugen Stulz (est@soton.ac.uk).

How to apply

To learn more about the application process, visit the INT2ACT recruitment web page (https://int2act.eu/open-positions/) and the University of Southampton PhD Application web site.

Required documents:

1. Statement of interest (limit of 2,500 characters) explaining why you wish to be considered for the fellowship and which qualities and experience you will bring to the role.
2. Curriculum vitae et studiorum.
3. A certificate of University examinations taken (with marks).
4. A final degree certificate translated in English. If, at the time of application, candidates should not be yet in possession of a degree certificate, they can submit it at the time of the examination.

All documents must be merged into a single PDF file, in the order listed above.
A limited number of applicants will be invited for an interview and will be required to provide contact information of up to two contact persons for reference letters.

Application deadline

The closing date for applications is **January 31 2026.**