

## DC1: Emergence of selection in nucleopeptide replication networks

**Supervisor:** Prof. Gonen Ashkenasy, [gonenash@bgu.ac.il](mailto:gonenash@bgu.ac.il)

**Host institution:** Ben Gurion University of the Negev (BGU), Laboratory for Systems Chemistry, Be'er Sheva, Israel



Ben-Gurion University  
of the Negev

Ben-Gurion University of the Negev is one of Israel's largest research universities, with approximately 20,000 students enrolled in five Faculties, including a strong Natural Sciences faculty. It has what is perhaps the strongest chemistry department in Israel. The University offers studies toward PhD degrees in all relevant fields. [Gonen Ashkenasy's research group](#) studies systems chemistry for many years. Their research focuses on variable replication processes driven by peptides and related molecules.

**Project description:** The project main aims are thorough analysis of the kinetic behaviour of new replication networks incorporating nucleopeptide molecules and the search for replication-based selection towards single replicator(s) and sub-networks. The DC will analyse replication-driven processes in larger replication networks containing peptides attached to each one of the four nucleobases and characterize the behaviour of individual replicators and sub-networks under variable experimental setups (in batch and flow reactors), environmental conditions, and competition for resources. Specifically, DC1 will: (1) Explore the design, synthesis and assembly structure of nucleopeptide conjugates under variable concentrations and environmental conditions (pH, temperature, salt concentration). (2) Analyse the kinetic replication profiles for individual nucleopeptides and binary networks of nucleobase-complementary conjugates, under the above-mentioned variable conditions, different set-ups (closed systems vs. flow), and competition for resources (freely available raw materials vs. starvation). (3) Investigate the emergence of selection of the best fit molecule(s) based on the network topology and individual replication efficiencies. (4) Explore enhancing replication in reaction networks operating under flow conditions affording 'open ended' mutation and feedback.

**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:

- Host: École Supérieure de Physique et de Chimie Industrielles de la Ville de Paris (ESPCI) | Length: 3 months | Purpose: Characterisation of nucleopeptide replication and selection in microfluidic systems.
- Host: ELVESYS (ELV) | Length: 2 months | Purpose: Explore novel microfluidics systems to enhance replication in reaction networks.

### Eligibility conditions:

- Please refer to [admission requirements](#) of the BGU Kreitman School of Advanced Graduate Studies.

### Required Skills:

- MSc or equivalent in Organic Chemistry. Priority will be given to candidates with experience in supramolecular chemistry and peptide chemistry.

### Monthly allowances:

- Living allowance: €3400\*
- Mobility allowance: €600
- Family allowance, if applicable: €660

**Estimated gross salary:** ~43,000 €/year

\* The living allowance is adjusted by a [country correction coefficient](#), depending on the country where the host institution is located. The exact net salary is dependent on local tax and social and health insurance regulations and will be confirmed upon appointment.

### Enquiries

For general information about the DarChemDN visit the [project website](#) or send an email to [info@darchem-dn.eu](mailto:info@darchem-dn.eu).



Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Research Executive Agency. Neither the European Union nor the granting authority can be held responsible for them. (Grant Agreement No. 101119956)

## How to apply

To complete your online application, visit the [DarChemDN recruitment web page](#).

### Required documents:

- Cover Letter
- Curriculum Vitae (including contact information of two referees)
- Copy of Transcripts
- Copy of Diplomas (if available at the time of application – otherwise please provide a confirmation with the expected graduation date)

Only shortlisted applicants will be contacted. Interviews are expected to be online in November/December 2023.

**Application deadline:** To receive full consideration, applications must be submitted before **31 October 2023**.



Funded by  
the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Research Executive Agency. Neither the European Union nor the granting authority can be held responsible for them. (Grant Agreement No. 101119956)