

DC9: Functional multi-stable synthetic networks

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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 will focus on the functionalities of multi-stable networks. Using coiled-coil replicators, BGU have shown that autocatalytic reactions can serve as positive feedback to induce a phase transition from simple equilibration into bistable and oscillatory behaviours.

The DC will experimentally analyse bistable, multi-stable and oscillatory functionality under a wide parameter space by varying the peptide sequences, as well as external parameters such as temperature, pH and the concentrations of various salts. Using simulations, BGU have recently shown how coupling reaction networks, each exhibiting different kinetic behavior, yields new systems with interesting characteristic, exhibiting for example multiple steady states. The DC will experimentally study this multi-stationarity (rarely analysed before) and will probe ways for systematically programming and tuning its characteristics.

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: University of Groningen (RUG) | Length: 3 months | Purpose: Studying self-replication super systems combining assembly-driven replication and template replication.
- Host: Parmenides Foundation (PARM)/ Paradigmatic Innovations GmbH (PARA) | Length: 3 months | Purpose: Explore theoretical and computational methods to model network rewiring.

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: ~43,500 €/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.



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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**.



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