Project 3.6. Modulation of stability of virions – development of bacteriophage stabilization methods.

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Background:
Viruses are not only our enemies, but also allies in number of applications. Thus, an affordable method for stabilization of viruses under harsh conditions is an issue that requires immediate response. The modulation of stability of viruses will be demonstrated on the example of bacteriophages (phages in short) – viruses, which hosts are bacteria. Bacteriophages are used as active ingredients in biocontrol agents, in phage therapies (against drug-resistant bacteria), as sensing elements of biosensors, carriers of genetic information in gene therapies or in phage display method. Importantly, some species (like bacteriophage MS2) are regarded as great models routinely utilized for studies on viruses attacking eukaryotic (also human) cells. Therefore, the work might have also impact on increase of stability of vaccines It is crucial as up to 80% of costs of vaccination programs is generated by the need of storage and transportation of vaccines in the low temperatures.
Capsid is part of the virion, where genetic information is stored. Capsid proteins are held together by non-covalent interactions, which are prone to be destabilized by external factors, i.e. slight increase of the temperature or osmotic pressure. The project aims at development of physicochemical means, which increase number of survivor virions upon exposition to external, deactivating factors.

Aim:
Project aims at stabilizing of bacteriophages. The search of the appropriate stabilizing agents will begin with polymers, modified polymers and linkers, which will be cleaved upon addition of specific reagents (e.g. enzymes). The stabilizing effect of developed agents will be tested primarily, but not exclusively, against elevated temperature. Developed agents will have low cytotoxicity. The project aims at explanation of mechanisms of phage deactivation and how developed agents counteract them.

Requirements:
The project is highly interdisciplinary and combines essential methods of biotechnology, molecular biology, physical chemistry and nanotechnology. The successful candidate is expected to show scientific initiative, perform experiments independently, plan the workflow, maintain research notes and participate in the decision making process. He/she will need to build experimental setups, calibrate them, plan and perform control experiments and analyze the data. Contribution through regular reporting and publishing, taking part in and presenting at group meetings and conferences is mandatory.

From our experience the background in biotechnology would be appropriate, as it allows to adapt to both chemistry and biology tasks. However, applicants with other backgrounds will be also considered based on the possible input to the project (e.g. chemists, biologists, physicists, engineers or similar).
Ability to work independently as well as in a group and proficiency in English speaking and writing are required. Successful candidate is expected to contribute to the efficient functioning of the lab by providing help and supervision to junior members of the group and by fulfilling necessary administrative and organizational tasks.