Deutsche Forschungsgemeinschaft (German Research Foundation)
Information for Researchers

Call for Proposals

No. 52 **22 August 2018**

Priority Programme "Next Generation Optogenetics: Tool Development and Application" (SPP 1926)

The Senate of the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) established the Priority Programme "Next Generation Optogenetics: Tool Development and Application" (SPP 1926). The programme is designed to run for six years. The present call invites proposals for the second three-year funding period.

Optogenetic methods and tools revolutionised research in neuroscience and cell biology, as they elegantly enable light-controlled manipulation of cellular functions. Although the main scope of optogenetics has been in basic science, applications in biomedicine are emerging, e.g., drug screening and, possibly, new prospects for therapy. To explore new aspects in areas ranging from microbial cell biology to in vivo physiology, this priority programme aims to take optogenetic methods to the next level. The implementation of novel light control mechanisms and the engineering of proteins with light-sensitive moieties beyond natural proteins will allow targeting previously non-addressable cellular activities. Such tool development has to be both mechanism- and application-driven, and thus requires close interactions between disciplines such as biophysics, cell biology, neuroscience, and engineering. Importantly, the new optogenetic tools have to be implemented in animal models. The SPP 1926 thus requires collaborative efforts between photobiologists, biophysicists, chemists, cell biologists, tool implementers, hardware developers or biomedical scientists, who will combine their expertise, e.g. in "tandems", to mechanistically understand the proteins, design highly specific chemical photoswitches, implement them in cells and animals and develop optogenetic therapies.

In the second funding period, the Priority Programme "Next Generation Optogenetics" will include projects covering the following topics:

- Spectroscopy, theory and modelling to characterise novel optogenetic tools and to enable modification of their properties, hand in hand with tool implementation
- Optogenetic tools with high sensitivity via amplification mechanisms, or by combined systems, i.e. light-switchable proteins that trigger high-conductance ion channels
- Generation of light-gated channels selective for K+ or Ca2+; novel optogenetic tools enabling efficient light-induced gene expression, protein-protein interactions, cell ablation, protein inactivation or degradation
- Targeting of optogenetic tools to intracellular compartments, and novel targeting techniques for expressing optogenetic tools in small subsets of neurons in vertebrates

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- Efficient novel genetically encoded optical sensors for membrane voltage, 2nd messengers (not Ca2+) or metabolites, as well as optimised genetically encoded sensors for optoacoustic imaging, combined with optogenetic actuators
- Novel applications of optogenetic tools with the distinct aim of biomedical intervention or therapy
- Tailoring existing optogenetic tools or applications for addressing fundamental biological questions in areas previously not amenable to optical approaches (immunology, cancer research, reproductive medicine, antibiotics development, etc.)
- Genetically addressable and reversible chemical photoswitches and photopharmacological agents, specific for distinct cellular targets or proteins
- Engineering of novel concepts in optoelectronics and light delivery, combined with optogenetics, addressing distinct biological questions, or biomedical application

The Priority Programme will not include projects that focus on:

- Mere application of existing and established optogenetic tools without novelty or methods development
- Mutagenesis for color tuning or affecting photocycle kinetics of well-established opsins such as channelrhodopsin
- Projects with sole focus on improvement of established light delivery methods
- Mere, irreversible photo-uncaging of ligands or molecules that are not specifically tailored to one distinct type of protein or receptor

Proposals must be written in English and submitted to the DFG by **5 December 2018**. Please note that proposals can only be submitted via elan, the DFG's electronic proposal processing system.

Applicants must be registered in elan prior to submitting a proposal to the DFG. If you have not yet registered, please note that you must do so by **28 November 2018** to submit a proposal under this call; registration requests received after this time cannot be considered. You will normally receive confirmation of your registration by the next working day. Note that you will be asked to select the appropriate Priority Programme call during both the registration and the proposal process.

If you would like to submit a proposal for a new project within the existing Priority Programme, please go to Proposal Submission – New Project – Priority Programmes and select "SPP 1926" from the current list of calls. Previous applicants can submit a proposal for the renewal of an existing project under Proposal Submission – Proposal Overview/Renewal Proposal.

In preparing your proposal, please review the programme guidelines (form 50.05, section B) and follow the proposal preparation instructions (form 54.01). These forms can either be downloaded from our website or accessed through the elan portal. In addition to submitting your proposal via elan, please send an electronic copy to the programme coordinator.

Further Information

More information on the Priority Programme is available under:
www.spp1926.org

The elan system can be accessed at:
https://elan.dfg.de/en/

DFG forms 50.05 and 54.01 can be downloaded at:
www.dfg.de/formulare/50_05/
www.dfg.de/formulare/54_01/

For scientific enquiries please contact the Priority Programme coordinator:
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Questions on the DFG proposal process can be directed to:
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