Deutsche Forschungsgemeinschaft (German Research Foundation)
Information for Researchers

Call for Proposals

No. 94 14 December 2018

Solar-driven chemistry 2019/2020

International call for applications Chemistry and Process Engineering

In natural photosynthesis, carbon dioxide is converted into complex chemical compounds by using sunlight (photons) as the energy source. Solar energy is thus stored in chemical bonds. Developing technical processes for the direct conversion of solar energy into chemical compounds by means of artificial compounds, using universally available raw materials such as carbon dioxide and/or water, is a scientific and technical "grand challenge" with tremendous societal impact. Such an approach does not rely on low-carbon electricity from traditional or renewable energy sources, as the photons arriving at the earth are directly used for (photo-)chemical processes, and no intermediate storage or transfer of electricity is needed.

Although the topic is not new and feasibility of several solar-driven chemical approaches has been demonstrated on a laboratory scale, this is still a visionary goal where many fundamental scientific questions have to be answered before it can be implemented on a meaningful technical scale along the value chain. Non-exclusive examples of associated fundamental research for the photochemical conversion of small molecules into valuable products are: development and improvement of methods and materials for light harvesting and stable (photo-)catalysts, both based on commonly available raw materials, development of analytical, theoretical and computational tools to understand the thermodynamics and to predict the reactivity of such materials, understanding of energy transfer and conversion processes in de novo designed man-made organic and inorganic materials, etc.

Subject of this call for proposals is fundamental research in all sub-areas relevant to the photochemical transformation of small, abundant molecules, such as carbon dioxide, water or nitrogen, into more valuable, storable chemicals by means of solar radiation. Focus of the proposals should be on the photochemical processes (reactions) and on solving fundamental problems. Typical (but not exclusive) examples include preparative, physicochemical, analytical and theoretical work (always related to the general call topic) on

- Research on light-converting/harvesting, catalytic, electrode, membrane, etc. materials
- Materials issues (e.g. photochemical stability of relevant materials), as long as they are used for the photochemical conversion of small molecules
- Investigating mechanisms of catalysis and light harvesting, if focus is on photochemical conversion of small molecules
- Heterogeneous photoelectrochemistry/photocatalysis
- Photocatalytic water splitting
- Photochemical or photoelectrochemical CO_2 reduction
- Development of new photoactive systems if related to the general call topic
- Reaction engineering

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- Molecular model systems capable of direct conversion, e.g. for mechanistic studies

The following topics are excluded from the call:

- Conversion by living organisms and biocatalysts (enzymes, etc.) unless the biocatalysts are used in combination with a synthetic catalyst
- Improvement or scale-up of known technologies, such as Fischer-Tropsch, methanol, hydrogen or syngas technologies, water electrolysis, etc., unless completely new catalysts are being developed
- Optimization of established (photo)catalytic systems
- Thermal processes driven by solar energy (e.g. by concentrating solar power technologies etc.)
- CO_2 concentration and storage
- Reactor design
- Standard photocatalytic reactions (e.g., catalytic reactions using UV radiation)
- Genetic engineering of plants for this purpose
- Biomass conversion

Submission details

Chemists and engineers who are eligible to apply for financial support from any of the participating funding organisations are cordially invited to apply jointly within the subject of this call. A list of the respective organisations including contact details is given below. Joint proposals can be submitted by at **least two and up to four applicants located in at least two and up to four different countries**; special rules may apply for certain combinations, please check the "call websites" of the respective participating organisations below for further information.

Each applicant is only allowed to participate in one application within this call.

The projects must comprise novel and ambitious ideas in the subject area of this call. The scientific level of the projects should be high in international comparison. Although the scientific quality of the proposals is the decisive criterion, joint projects must also demonstrate a clear added value to the applicants' cooperation over and above what could be achieved individually.

There will be a two-stage procedure involving pre-proposals and full proposals. The DFG acts as Call Secretariat, therefore all pre-proposals and full proposals must submitted to DFG's "elan" submission system.

All pre-proposals must be submitted no later than Wednesday, 13 February 2019. Please note that all applicants need to be registered in the "elan" system. The confirmation of the registration takes about 3 working days; **please register on Friday, 8 February 2019 the latest**!

Successful applicants from the pre-proposal stage will be invited approximately mid-June 2019 to submit their full proposals **no later than 31 July 2019**.

In the full proposal phase, each applicant may request funding for individual grants according to national rules and national general conditions; for further details see the respective "call websites" below. Joint projects will be funded for three years starting not later than spring 2020. A template and list of required documents will be provided to the preproposals invited to participate to the second stage.

The evaluation criteria are as follows:

- Scientific background: CV, track record, quality of publications and capability for independent scientific work of all applicants in relation to their scientific age.
- Research proposal: Added value of cooperation, originality and novelty of the idea, innovative value and scientific impact of research subject.
- Feasibility of the project: Feasibility of the work plan, risk involved, choice of methods, tools, instrumentation, capability of the applicant's institutions to provide scientific infrastructure for their proposed research

The review process for both stages will be conducted by a Review Board consisting of international experts.

Special rules for German applicants

As DFG offers already the possibility for bilateral proposals with most of the partners, interested applicants are referred to the respective bilateral submission possibilities. In detail:

Polish-German annual call: http://www.dfg.de/foerderung/info_wissenschaft/info_wissenschaft_18_60/index.html

French-German annual call: http://www.dfg.de/en/dfg_profile/international_cooperation/international_context/partner_organisations/france/anr_nle/index.html

Swiss-German permanent submission opportunity: http://www.dfg.de/foerderung/programme/internationale_foerdermassnahmen/antragstellung_oesterreich_schweiz/index.html

These bilateral combinations are not eligible to apply within this call. Bilateral Finnish-German proposals and any trilateral or quadrilateral proposals with German participation are allowed within this call.

The usual eligibility regulations for DFG programmes for individual funding apply. In doubt, researchers are strongly encouraged to contact the German contact point.

Further information
Information on the submission of pre-proposals can be found here:
www.dfg.de/download/pdf/foerderung/info_wissenschaft/2018/call_solar_driven_chemistry_guidelines.pdf

Participating organisations and contact points

Finland: Suomen Akatemia (AF)
Contact: Science Adviser Minna Räisänen, e-mail: minna.raisanen@aka.fi
Call website: https://www.aka.fi/fi/rahoitus/rahoitusmahdollisuudet/akatemian-lahihaut/kansainvalinen-yhteisrahoitteinen-haku-solar-driven-chemistry-sdc--tutkimusohjelma/

France: Agence National de la Recherche (ANR)
Contact: Dr. Olivier Spalla, e-mail: olivier.spalla@anr.fr ; Dr. Aurélie Paquirissamy, e-mail : aurelie.paquirissamy@anr.fr

Call website : http://anr.fr/Solar-dChemistry-2019

Germany: Deutsche Forschungsgemeinschaft e.V. (DFG)
Contact: Dr.-Ing. Georg Bechtold, e-mail: Georg.bechtold@dfg.de
Call website: www.dfg.de/info_wissenschaft/solardrivenchemistry/

Poland: Narodowe Centrum Nauki (NCN)
Contact: Dr Marta Buchalska, marta.buchalska@ncn.gov.pl, tel. +48 12 341 9158, Marlena Wosiak, marlena.wosiak@ncn.gov.pl, tel. +48 12 341 9093
Call website: https://ncn.gov.pl/wspolpraca-zagraniczna/wspolpraca-wielostronna/solar-driven-chemistry

Switzerland: Swiss National Science Foundation (SNSF)
Contact: Dr Stephan Cludius-Brandt, email: stephan.cludius@snf.ch
Call website: http://www.snf.ch/de/foerderung/ausschreibungen

For questions relating to the online application system:

Call Secretariat: DFG, Germany
Contact:
Proposal submission: Agnes Küster, e-mail: agnes.kuester@dfg.de, tel. +49 228 885 2298
General questions: Dr.-Ing. Georg Bechtold, e-mail: Georg.bechtold@dfg.de