

NSF-DFG Lead Agency Activity in Electrosynthesis and Electrocatalysis (NSF-DFG EChem)

PROGRAM SOLICITATION NSF 20-578



National Science Foundation

Directorate for Mathematical and Physical Sciences
Division of Chemistry

Directorate for Engineering
Division of Chemical, Bioengineering, Environmental and Transport Systems



Deutsche Forschungsgemeinschaft

Full Proposal Deadline(s) (due by 5 p.m. submitter's local time):

September 30, 2020

An Expression of Interest (EOI) must be submitted to NSDFDG@nsf.gov by July 1, 2020, prior to the submission of a full proposal.

IMPORTANT INFORMATION AND REVISION NOTES

The information below pertains to U.S. Researchers when NSF serves as the Lead Agency. For German researchers or for proposals submitted to DFG as the Lead Agency, please consult the DFG funding website https://www.dfg.de/en/research_funding/announcements_proposals/index.jsp for additional information.

Any proposal submitted in response to this solicitation should be submitted in accordance with the revised *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) (NSF 20-1), which is effective for proposals submitted, or due, on or after June 1, 2020.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

NSF-DFG Lead Agency Activity in Electrosynthesis and Electrocatalysis (NSF-DFG EChem)

Synopsis of Program:

Recognizing the importance of international collaborations in promoting scientific discoveries, the National Science Foundation (NSF) and the Deutsche Forschungsgemeinschaft (German Research Foundation, DFG) have signed a Memorandum of Understanding (MoU) on research cooperation. The MoU provides an overarching framework to enhance opportunities for collaborative activities between U.S. and German research communities and sets out the principles by which jointly-supported activities might be developed. To facilitate the support of collaborative work between U.S. researchers and their German counterparts under this MoU, the Division of Chemistry (CHE) and the Division of Chemical, Bioengineering, Environmental and Transport Systems (CBET) at the NSF and the Divisions of Physics and Chemistry (PC) and Engineering Sciences (ING 1) at the DFG are pleased to announce a Lead Agency Activity in the areas of Electrosynthesis and Electrocatalysis.

We are particularly interested in novel and fundamental electrochemical reactions and studies addressing transformations in organic and polymer synthesis, water splitting (hydrogen/oxygen evolution), and nitrogen reduction (ammonia production). Relevant activities include, but are not limited to, mechanistic studies; catalyst design, synthesis, and characterization; computational modeling, theory, and simulation; and experimental tool development. For fundamental engineering science projects, we are interested in studies involving reaction engineering, reactor system design, and component or device scale studies as examples that provide fundamental knowledge supporting scale-up of systems. In addition, fundamental engineering science projects involving alternative (to thermal) activation mechanisms such as microwaves (e.g. microwave assisted catalysis) and low temperature plasmas (e.g. plasma-assisted catalysis) are welcomed.

The goal of this Lead Agency Activity is to reduce current barriers to working internationally by allowing U.S. and German researchers to submit a single collaborative proposal that will undergo a single review process while funding organizations maintain budgetary

control over their awards. Proposals eligible for funding consideration through this Lead Agency Activity in FY 2021 will need to have a research focus relevant to the topic areas identified above, within the scope of research supported through these divisions. Proposers should review the CHE, CBET, PC, and ING 1 program descriptions for research supported through these divisions/organizations. Proposals are expected to adhere to typical proposal budgets and durations for the relevant CHE, CBET, PC, and ING 1 programs from which funding is sought. German researchers are invited to read: https://www.dfg.de/en/research_funding/announcements_proposals/index.jsp.

Proposals submitted under this Activity will be reviewed by either NSF or DFG as the Lead Agency, depending where the largest proportion of research lies. Proposals must provide a clear rationale for the need for a U.S.-German collaboration, including the unique expertise and synergy that the collaborating groups will bring to the project. The result of the review process will be shared among the appropriate divisions (NSF/CHE and/or NSF/CBET, and DFG/PC and/or DFG/ING 1) before making final recommendations.

Cognizant Program Officer(s):

Please note that the following information is current at the time of publishing. See program website for any updates to the points of contact.

- Kenneth Moley, CHE, telephone: (703) 292-8441, email: NSFDFG@nsf.gov
- Brandi Schottel, CBET, telephone: (703) 292-4798, email: NSFDFG@nsf.gov
- Markus Behnke, DFG/PC, telephone: 49 (228) 885-2181, email: NSF-DFG-Chemistry@dfg.de
- Ilka Paulus, DFG/PC, telephone: 49 (228) 885-2021, email: NSF-DFG-Chemistry@dfg.de
- Georg Bechtold, DFG/ING 1, telephone: 49 (228) 885-2818, email: NSF-DFG-Chemistry@dfg.de

Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.041 --- Engineering
- 47.049 --- Mathematical and Physical Sciences

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 4 to 10

Average award size and duration (varies with different participating program limits) are subject to the availability of funds.

Anticipated Funding Amount: \$2,000,000 to \$5,000,000

This funding amount is approximate and is subject to availability of funds. The overall funding for the program is established independently by each participating division. Estimated program budget, number of awards and average award size/duration are subject to the availability of funds.

Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Institutions of Higher Education (IHEs) - Two- and four-year IHEs (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Special Instructions for International Branch Campuses of US IHEs: If the proposal includes funding to be provided to an international branch campus of a US institution of higher education (including through use of subawards and consultant arrangements), the proposer must explain the benefit(s) to the project of performance at the international branch campus, and justify why the project activities cannot be performed at the US campus.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

Limit on Number of Proposals per PI or Co-PI: 1

An individual may appear as Principal Investigator (PI), co-PI, or senior personnel on only one proposal per annual cycle submitted in response to this solicitation.

If an individual is listed as PI, co-PI, or senior personnel on more than one proposal to this solicitation, then only the first such submitted proposal will be considered. The remaining submission(s) will be returned without review.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not required
- **Preliminary Proposal Submission:** Not required
- **Full Proposals:**
 - Full Proposals submitted via FastLane: *NSF Proposal and Award Policies and Procedures Guide (PAPPG)* guidelines apply. The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.
 - Full Proposals submitted via Research.gov: *NSF Proposal and Award Policies and Procedures Guide (PAPPG)* guidelines apply. The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.
 - Full Proposals submitted via Grants.gov: *NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov* guidelines apply (Note: The *NSF Grants.gov Application Guide* is available on the Grants.gov website and on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide).

B. Budgetary Information

- **Cost Sharing Requirements:**

Inclusion of voluntary committed cost sharing is prohibited.
- **Indirect Cost (F&A) Limitations:**

Not Applicable
- **Other Budgetary Limitations:**

Other budgetary limitations apply. Please see the full text of this solicitation for further information.

C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. submitter's local time):

September 30, 2020

An Expression of Interest (EOI) must be submitted to NSFDFG@nsf.gov by July 1, 2020, prior to the submission of a full proposal.

Proposal Review Information Criteria

Merit Review Criteria:

National Science Board approved criteria. Additional merit review criteria apply. Please see the full text of this solicitation for further information.

Award Administration Information

Award Conditions:

Standard NSF award conditions apply.

Reporting Requirements:

Standard NSF reporting requirements apply.

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I. INTRODUCTION

The Directorate for Mathematics and Physical Sciences (MPS), Division of Chemistry (CHE) and the Directorate for Engineering (ENG), Division of Chemical, Bioengineering, Environmental, and Transport Systems (CBET) of the National Science Foundation (NSF) and the Divisions of Physics and Chemistry (PC) and Engineering Sciences 1 (ING 1) of the Deutsche Forschungsgemeinschaft (German Research Foundation, DFG) are pleased to announce a NSF-DFG Lead Agency Activity in the areas of Electrosynthesis and Electrocatalysis. The goal of this Lead Agency Activity is to reduce current barriers to working internationally by allowing U.S. and German researchers to submit a single collaborative proposal that will undergo a single review process while funding organizations maintain budgetary control over their awards. The prospective investigators must discuss within their research team where they feel the largest proportion of research lies and agree on a lead agency (either NSF or DFG). Proposals eligible for funding consideration through this Lead Agency Activity in FY 2021 will need to have a research focus relevant to electrosynthesis or electrocatalysis as determined by assessment of an Expression of Interest (EOI). Prior to submitting the EOI, proposers should review the CHE, CBET, PC and ING program descriptions for research supported through these divisions. Proposals are expected to adhere to typical proposal budgets and durations for the relevant CHE, CBET, PC and ING programs from which funding is sought. German researchers are invited to read https://www.dfg.de/en/research_funding/announcements_proposals/index.jsp.

Proposals submitted under this Activity will be reviewed by either NSF or DFG as the Lead Agency, depending on where the largest proportion of research lies. Proposals must provide a clear rationale for the need for a U.S.-German collaboration, including the unique expertise and synergy that the collaborating groups will bring to the project. The results of the review process will be shared among the appropriate divisions (NSF/CHE and/or NSF/CBET as well as DFG/PC and/or DFG/ING 1) before making final recommendations.

II. PROGRAM DESCRIPTION

The core programs of ENG/CBET, MPS/CHE, DFG/PC, and DFG/ING 1 recognize that researchers in both the U.S. and Germany perform world-class research. While both NSF and DFG always encourage international collaborations on core program submissions, the need for two separate review processes makes funding these types of collaborations difficult for U.S.-German research teams. This solicitation is designed to eliminate this complication by allowing a collaborative proposal that includes both an eligible US collaborator and an eligible German collaborator to submit one joint proposal to one organization for one review process. Both agencies will honor the decision of this single review process, thereby paving the way for more potential U.S.-German collaborative projects. Before a team can submit a proposal, they must decide which investigator will lead the overall joint U.S.-German project. This is determined by where the greatest proportion of research will be performed. The reviewing organization, NSF or DFG should be that of the lead investigator. However, NSF and DFG reserve the right (based on assessment of an Expression of Interest (EOI)) to make the final decision as to which organization will act as the lead for the review process. This solicitation is the mechanism for NSF to act as the "lead" organization. For research teams that would like DFG as the lead organization, please see instructions at: https://www.dfg.de/en/research_funding/announcements_proposals/index.jsp. For a proposal to be eligible for this collaborative solicitation, the proposal topic must fall within the scope of a participating division/program in both NSF and DFG. Researchers are strongly encouraged to contact the cognizant NSF program director about US project funding limits (since they vary from program to program at NSF), if this limit is not outlined on the program page in question.

The U.S. and Germany share a proud history of leadership in chemical synthesis and related manufacturing processes. Examples include catalytic cracking for petroleum processing from the US side, and the Haber-Bosch process for ammonia production from the German side. Such processes are typically run in massively scaled, centralized plants with huge demands for fossil-fuel energy and with associated emissions of carbon dioxide. Both the NSF and DFG recognize an urgent need to support research focused on discovering and developing new chemical synthesis methods that are both energy efficient and compatible with non-fossil fuel energy sources. Electrosynthesis and Electrocatalysis – practiced at scale that is compatible with localized access to renewable and/or sustainable energy – offers the best current opportunities to realize small-scale distributed chemical plants located close to both feedstocks and end-users of chemical products. To that end, this Lead Agency Activity welcomes proposals in the areas of electrochemical synthesis and electrocatalysis that provide fundamental insight into synthetic or catalytic approaches focused on novel chemistries that are compatible with distributed and intensified processes for chemical manufacturing. NSF and DFG are particularly interested in novel and fundamental electrochemical reactions and studies addressing transformations in organic and polymer synthesis, water splitting reactions (hydrogen/oxygen evolution), and nitrogen reduction (ammonia production). Relevant activities include, but are not limited to, mechanistic studies; catalyst design, synthesis, and characterization; computational modeling, theory, and simulation; and experimental tool development. For fundamental engineering science projects, we are interested in studies involving reaction engineering, reactor system design, and component or device scale studies as examples that provide fundamental knowledge supporting scale-up of systems. In addition, fundamental engineering science projects involving alternative (to thermal) activation mechanisms such as microwaves (e.g. microwave assisted catalysis) and low temperature plasmas (e.g. plasma-assisted catalysis) are welcomed.

III. AWARD INFORMATION

The Program estimates a Fiscal Year (FY) 2021 budget of \$2,000,000 to \$5,000,000 and expects to make 4-10 awards.

Estimated program budget, number of awards and average award size/duration are subject to the availability of funds.

Further information about organization processes and organization-specific award information is provided in the full text of this solicitation.

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Institutions of Higher Education (IHEs) - Two- and four-year IHEs (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Special Instructions for International Branch Campuses of US IHEs: If the proposal includes funding to be provided to an international branch campus of a US institution of higher education (including through use of subawards and consultant arrangements), the proposer must explain the benefit(s) to the project of performance at the international branch campus, and justify why the project activities cannot be performed at the US campus.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

Limit on Number of Proposals per PI or Co-PI: 1

An individual may appear as Principal Investigator (PI), co-PI, or senior personnel on only one proposal per annual cycle submitted in response to this solicitation.

If an individual is listed as PI, co-PI, or senior personnel on more than one proposal to this solicitation, then only the first such submitted proposal will be considered. The remaining submission(s) will be returned without review.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Preparation Instructions: Proposers may opt to submit proposals in response to this Program Solicitation via FastLane, Research.gov, or Grants.gov.

- Full proposals submitted via FastLane: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG). The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=papppg. Paper copies of the PAPPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-8134 or by e-mail from nsfpubs@nsf.gov. Proposers are reminded to identify this program solicitation number in the program solicitation block on the NSF Cover Sheet For Proposal to the National Science Foundation. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.
- Full Proposals submitted via Research.gov: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the *NSF Proposal and Award Policies and Procedures Guide* (PAPPG). The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=papppg. Paper copies of the PAPPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-8134 or by e-mail from nsfpubs@nsf.gov. The Prepare New Proposal setup will prompt you for the program solicitation number.
- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the *NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov*. The complete text of the *NSF Grants.gov Application Guide* is available on the Grants.gov website and on the NSF website at: (https://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-8134 or by e-mail from nsfpubs@nsf.gov.

In determining which method to utilize in the electronic preparation and submission of the proposal, please note the following:

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via FastLane or Research.gov. PAPPG Chapter II.D.3 provides additional information on collaborative proposals.

See PAPPG Chapter II.C.2 for guidance on the required sections of a full research proposal submitted to NSF. Please note that the proposal preparation

instructions provided in this program solicitation may deviate from the PAPPG instructions.

1. Prior to submission, prospective PIs are strongly encouraged to contact appropriate program officers to discuss the suitability of their proposed research. The prospective PIs must discuss within their research team where they feel the largest proportion of research lies and agree on a lead agency (either NSF or DFG).
2. An Expression of Interest (EOI) is required prior to the submission of a formal proposal. For NSF, the EOI is due **no later than July 1, 2020 , 5pm local time**. The EOI should contain:
 - a. An indication of the target program for the proposed topic in the participating divisions at both NSF and DFG. Please note that the PI-indicated target program may not be the only program that will consider the submitted EOI. The submitted EOI may be shared with other interested programs within NSF and DFG;
 - b. A brief description of the proposed research, including a breakdown of the German/US contributions to the research. The document submitted should not exceed 5000 characters, including spaces;
 - c. The names and affiliations of the researchers; and
 - d. Bottom line estimates of total funding to be requested from NSF (including indirect costs) and from DFG. A detailed budget is not required at this time.
3. If NSF is the lead agency, PIs should email the Expression of Interest (EOI) to NSFDFG@nsf.gov;

If DFG is the lead agency, PIs should email the Expression of Interest (EOI) in a password-protected ZIP file to NSF-DFG-Chemistry@dfg.de. Please submit the corresponding password in a separate email.

4. **Please note that the due date of July 1, 2020 is the EOI deadline of all participating divisions/programs in both funding organizations for this Lead Agency Activity.**
5. **The lead agency will share all EOIs received with the non-lead agency in order for both funding organizations to validate whether the proposed research is within the participating funding organization's portfolio and if the institutions meet the funding organization's eligibility requirements (following the regulations for the participating NSF and DFG programs for funding).**
6. Upon confirmation from both funding organizations that the collaborative research proposal is appropriate for the NSF-DFG Echem solicitation, the lead agency will then contact the researchers to inform them that they may submit a full research proposal to the lead agency. In some cases, an alteration of the NSF and/or the DFG budget request, their lead agency role, and/or the target program may be required in the full proposal submission.

Special Instructions (in addition to the PAPPG requirements) for full proposal submissions are required when NSF is the lead agency:

1. Cover Sheet
2. Title of the Proposal
3. Project Description
4. Biographical Sketches
5. Budget
6. Results from Prior NSF Support
7. Current and Pending Support
8. Supplementary Documents
9. Single Copy Documents - "Collaborators and Other Affiliations"

Cover Sheet

Germany should be reported on the Cover Sheet under "International Activities: Country/Countries Involved." If additional countries are involved outside of the U.S. and Germany, please include those here as well. **All German collaborators should be listed as "non-funded Senior Personnel" ONLY.** Do NOT list a German collaborator as a PI or co-PI.

Title of the Proposal

The title of the proposal should begin with "NSF-DFG Echem:".

Project Description

Proposals should clearly describe the work that will be accomplished by the entire team, including the German partners. Please note that German collaborators are exempt from the Results from Prior NSF Support section requirement.

Biographical Sketches

All German collaborators should be listed as "non-funded Senior Personnel" and should have a Biographical Sketch in the appropriate section of the proposal with a format that conforms to the NSF PAPPG guidelines. Additional information about NSF-approved formats for the biographical sketch is available at <https://www.nsf.gov/bfa/dias/policy/biosketch.jsp>.

Budget

In addition to the U.S. budget and budget Justification, the German budget and budget justification should be included as a supplementary document. The German budget and budget justification should ONLY include the costs for the German collaborators, and the U.S. budget and budget justification should ONLY include the costs for the U.S. collaborators. See also Document 3: Other Supplementary Documents.

Proposals that request duplicative funding from NSF and DFG will be returned without review.

Current and Pending Support

This section must be filled out for all U.S. PIs, co-PIs and Senior Personnel. All German collaborators are exempt for this requirement unless they have funding from a U.S. government organization. Since this is a required section of an NSF proposal, however, please use the NSF fillable PDF form to indicate for each German investigator designated as Senior Personnel (non-funded) that Current and Pending Support information is not required. Additional information about NSF-approved formats for current and pending support is available at: <https://www.nsf.gov/bfa/dias/policy/cps.jsp>.

Facilities, Equipment, and Other Resources

This section should contain descriptions of both U.S. and German facilities, equipment, and other resources.

Supplementary Documents

Document 1: Postdoctoral Researcher Mentoring Plan for US-supported postdoctoral scholars (if Applicable) (up to 1 page)

Proposals that request funding to support postdoctoral researchers at U.S. organizations must include a description of the disciplinary and cross-disciplinary mentoring activities that will be provided for such individuals. Only one single-page mentoring plan is allowed per proposal even if multiple postdoctoral researchers from different organizations are involved. Thus, the postdoctoral researcher mentoring plan will be an additional means of providing cross-disciplinary mentoring across organizations and the project as a whole.

The U.S. Postdoctoral Researcher Mentoring Plan must be submitted under the specific tab indicated in Supplementary Documents.

Document 2: Data Management Plan

This plan should describe issues related to information exchange, intellectual property rights, derived products, databases, software, model output, and materials sharing. For example, if the proposed activity is expected to result in community resources (such as databases or collections of materials and samples), the "Data Management Plan" should present a clear plan for sharing of these resources not only among the project participants, but also with the scientific community at large. The "Data Management Plan" should also address plans for determining authorship or proper attribution of credit for peer-reviewed or other publications, internet resources, etc. that may be expected to result from the activity. It should not exceed 2 pages.

Document 3: Other Supplementary Documents (one PDF containing the three documents described below, plus any other necessary documents described in the PAPPG).

Please note that NO Biographical Sketches should appear in this section.

- A copy of the full proposal submission notification from NSF sent in response to the EOI must be included as a supplementary document.
- German Budget and Budget Justification: The German budget and budget justification must be included as a Supplementary Document. A detailed breakdown of funding requested from DFG, using the elan Proposal form and Justification of Resources must be added to the proposal as a Supplementary Document. This document will be shared with DFG to verify eligibility of costs requested.
- Letter(s) of Collaboration from participating German organization(s) and other collaborators.

Single Copy Documents

Provide information and other allowed items as noted in the current issuance of the PAPPG (for example, Collaborators and Other Affiliations and Suggested reviewers). **This is required for both U.S. and German collaborators.**

In parallel to submitting the proposal to NSF, the German partner is required to submit a copy of the proposal to DFG via elan, the DFG's electronic proposal processing system, to input the necessary information and forms into the corresponding system. The US investigators should be included as cooperation partners. In the proposal, the German partner should identify NSF as the lead agency.

For submissions where DFG is intended as the lead agency, please see DFG website https://www.dfg.de/en/research_funding/announcements_proposals/index.jsp for more details and instructions.

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

Other Budgetary Limitations:

If a proposal is selected for funding by NSF, the German PI(s) will be contacted by DFG to receive funding for the German portion of the award.

Proposals that request duplicative funding from NSF and DFG will be returned without review.

C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. submitter's local time):

September 30, 2020

An Expression of Interest (EOI) must be submitted to NSFDFG@nsf.gov by July 1, 2020, prior to the submission of a full proposal.

D. FastLane/Research.gov/Grants.gov Requirements

For Proposals Submitted Via FastLane or Research.gov:

To prepare and submit a proposal via FastLane, see detailed technical instructions available at: <https://www.fastlane.nsf.gov/a1/newstan.htm>. To prepare and submit a proposal via Research.gov, see detailed technical instructions available at: https://www.research.gov/research-portal/appmanager/base/desktop?_nfpb=true&_pageLabel=research_node_display&_nodePath=/researchGov/Service/Desktop/ProposalPreparationandSubmission.html. For FastLane or Research.gov user support, call the FastLane and Research.gov Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov or rgov@nsf.gov. The FastLane and Research.gov Help Desk answers general technical questions related to the use of the FastLane and Research.gov systems. Specific questions related to this program solicitation should be referred to the NSF

program staff contact(s) listed in Section VIII of this funding opportunity.

For Proposals Submitted Via Grants.gov:

Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. Comprehensive information about using Grants.gov is available on the Grants.gov Applicant Resources webpage: <https://www.grants.gov/web/grants/applicants.html>. In addition, the NSF Grants.gov Application Guide (see link in Section V.A) provides instructions regarding the technical preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: support@grants.gov. The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

Submitting the Proposal: Once all documents have been completed, the Authorized Organizational Representative (AOR) must submit the application to Grants.gov and verify the desired funding opportunity and agency to which the application is submitted. The AOR must then sign and submit the application to Grants.gov. The completed application will be transferred to the NSF FastLane system for further processing.

Proposers that submitted via FastLane or Research.gov may use Research.gov to verify the status of their submission to NSF. For proposers that submitted via Grants.gov, until an application has been received and validated by NSF, the Authorized Organizational Representative may check the status of an application on Grants.gov. After proposers have received an e-mail notification from NSF, Research.gov should be used to check the status of an application.

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program for acknowledgement and, if they meet NSF requirements, for review. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF either as *ad hoc* reviewers, panelists, or both, who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts of interest with the proposal. In addition, Program Officers may obtain comments from site visits before recommending final action on proposals. Senior NSF staff further review recommendations for awards. A flowchart that depicts the entire NSF proposal and award process (and associated timeline) is included in PAPPG Exhibit III-1.

A comprehensive description of the Foundation's merit review process is available on the NSF website at: https://www.nsf.gov/bfa/dias/policy/merit_review/.

Proposers should also be aware of core strategies that are essential to the fulfillment of NSF's mission, as articulated in *Building the Future: Investing in Discovery and Innovation - NSF Strategic Plan for Fiscal Years (FY) 2018 – 2022*. These strategies are integrated in the program planning and implementation process, of which proposal review is one part. NSF's mission is particularly well-implemented through the integration of research and education and broadening participation in NSF programs, projects, and activities.

One of the strategic objectives in support of NSF's mission is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions must recruit, train, and prepare a diverse STEM workforce to advance the frontiers of science and participate in the U.S. technology-based economy. NSF's contribution to the national innovation ecosystem is to provide cutting-edge research under the guidance of the Nation's most creative scientists and engineers. NSF also supports development of a strong science, technology, engineering, and mathematics (STEM) workforce by investing in building the knowledge that informs improvements in STEM teaching and learning.

NSF's mission calls for the broadening of opportunities and expanding participation of groups, institutions, and geographic regions that are underrepresented in STEM disciplines, which is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

A. Merit Review Principles and Criteria

The National Science Foundation strives to invest in a robust and diverse portfolio of projects that creates new knowledge and enables breakthroughs in understanding across all areas of science and engineering research and education. To identify which projects to support, NSF relies on a merit review process that incorporates consideration of both the technical aspects of a proposed project and its potential to contribute more broadly to advancing NSF's mission "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." NSF makes every effort to conduct a fair, competitive, transparent merit review process for the selection of projects.

1. Merit Review Principles

These principles are to be given due diligence by PIs and organizations when preparing proposals and managing projects, by reviewers when reading and evaluating proposals, and by NSF program staff when determining whether or not to recommend proposals for funding and while overseeing awards. Given that NSF is the primary federal agency charged with nurturing and supporting excellence in basic research and education, the following three principles apply:

- All NSF projects should be of the highest quality and have the potential to advance, if not transform, the frontiers of knowledge.
- NSF projects, in the aggregate, should contribute more broadly to achieving societal goals. These "Broader Impacts" may be accomplished through the research itself, through activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified.

Meaningful assessment and evaluation of NSF funded projects should be based on appropriate metrics, keeping in mind the likely correlation between the effect of broader impacts and the resources provided to implement projects. If the size of the activity is limited, evaluation of that activity in isolation is not likely to be meaningful. Thus, assessing the effectiveness of these activities may best be done at a higher, more aggregated, level than the individual project.

With respect to the third principle, even if assessment of Broader Impacts outcomes for particular projects is done at an aggregated level, PIs are expected to be accountable for carrying out the activities described in the funded project. Thus, individual projects should include clearly stated goals, specific descriptions of the activities that the PI intends to do, and a plan in place to document the outputs of those activities.

These three merit review principles provide the basis for the merit review criteria, as well as a context within which the users of the criteria can better understand their intent.

2. Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board approved merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two merit review criteria are listed below. **Both** criteria are to be given **full consideration** during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. (PAPPG Chapter II.C.2.d(i). contains additional information for use by proposers in development of the Project Description section of the proposal). Reviewers are strongly encouraged to review the criteria, including PAPPG Chapter II.C.2.d(i), prior to the review of a proposal.

When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:

- **Intellectual Merit:** The Intellectual Merit criterion encompasses the potential to advance knowledge; and
- **Broader Impacts:** The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.

The following elements should be considered in the review for both criteria:

1. What is the potential for the proposed activity to
 - a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
 - b. Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Broader impacts may be accomplished through the research itself, through the activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. NSF values the advancement of scientific knowledge and activities that contribute to achievement of societally relevant outcomes. Such outcomes include, but are not limited to: full participation of women, persons with disabilities, and underrepresented minorities in science, technology, engineering, and mathematics (STEM); improved STEM education and educator development at any level; increased public scientific literacy and public engagement with science and technology; improved well-being of individuals in society; development of a diverse, globally competitive STEM workforce; increased partnerships between academia, industry, and others; improved national security; increased economic competitiveness of the United States; and enhanced infrastructure for research and education.

Proposers are reminded that reviewers will also be asked to review the Data Management Plan and the Postdoctoral Researcher Mentoring Plan, as appropriate.

Additional Solicitation Specific Review Criteria

In addition to the standard NSF review criteria, the proposals will also be evaluated on the following:

- To what extent does the proposed research demonstrate a clear need for international collaboration?
- To what extent does the proposed research effectively use collaborative processes with iterative feedback among tasks and demonstrate the synergy between the collaborating groups?
- To what extent do the selected team members provide distinct, complementary expertise that is necessary to accomplish the aims of the project?
- To what extent is there an effective process for conducting the collaboration across two countries?
- To what extent does the proposed project provide meaningful international training experience to students and postdoctoral scholars?

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/or Panel Review, or combined review.

- While not identical, NSF and DFG share similar review principles. Proposals will be reviewed in accordance with the lead agency's review criteria. A description of the NSF merit review process is detailed here: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg;
- A description of the DFG review process can be found here: http://www.dfg.de/en/research_funding/proposal_review_decision/reviewers/index.html

When NSF is the Lead Agency,

- NSF retains sole responsibility for appointing reviewers and obtaining written reviews. DFG may suggest reviewers.
- NSF will follow its own conflict of interest and confidentiality policies. NSF will be responsible for obtaining any necessary conflict of interest

documentation and for resolving any conflicts in accordance with its standard rules and procedures.

- NSF will share unattributed reviews, and, where applicable, PI responses and unattributed panel summaries with DFG.
- After the reviews are received, NSF will use its usual internal procedures to determine whether a proposal will be recommended for award or declination. Program Directors from both funding organizations will then hold a joint meeting to communicate their respective decision-making process and the decisions for each proposal. The formal recommendation will be made by the NSF program director and then concurred by the cognizant NSF Division Director. NSF's Division of Grants and Agreements (DGA) will review the proposal from a business and financial perspective. Only DGA can make commitments on behalf of the NSF or authorize the expenditure of funds. NSF funding decisions are subject to the availability of funds.
- A deviation of the decision of the partner organization from that of the lead agency is possible. NSF reserves the right to negotiate final budgets with PIs prior to award. NSF reserves the right to fund U.S. researchers, regardless of DFG's decision to fund or not.
- NSF as the lead agency will send the notification of recommendation letter and comments from the peer review to the lead PI in accordance with its policies.

When NSF is not the Lead Agency,

- NSF may suggest reviewers.
- Once a German PI is notified of a pending award by DFG, the non-lead (U.S.) collaborator(s) associated with the project must submit a copy of the proposal to the proper program in NSF so that NSF has complete documentation of the overall proposed research project. The non-lead (U.S.) collaborator will receive submission instructions from NSF at that time.

Regardless of Lead Agency Status:

- When awards are made, the U.S. researchers will be supported by NSF and the German researchers will be supported by DFG.
- Because the participating organizations have different funding cycles, it is possible that some projects will have start dates delayed until funds become available.
- Should a proposal be declined for funding, proposers should refer to each funding organization's individual resubmission policies.

Reviewers will be asked to evaluate proposals using two National Science Board approved merit review criteria and, if applicable, additional program specific criteria. A summary rating and accompanying narrative will generally be completed and submitted by each reviewer and/or panel. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF strives to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. Large or particularly complex proposals or proposals from new awardees may require additional review and processing time. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director acts upon the Program Officer's recommendation.

After programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications. After an administrative review has occurred, Grants and Agreements Officers perform the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.

Once an award or declination decision has been made, Principal Investigators are provided feedback about their proposals. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers or any reviewer-identifying information, are sent to the Principal Investigator/Project Director by the Program Officer. In addition, the proposer will receive an explanation of the decision to award or decline funding.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See Section VI.B. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award notice, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award notice; (4) the applicable award conditions, such as Grant General Conditions (GC-1)*; or Research Terms and Conditions* and (5) any announcement or other NSF issuance that may be incorporated by reference in the award notice. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

*These documents may be accessed electronically on NSF's Website at https://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-8134 or by e-mail from nsfpubs@nsf.gov.

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the NSF

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer no later than 90 days prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). No later than 120 days following expiration of a grant, the PI also is required to submit a final project report, and a project outcomes report for the general public.

Failure to provide the required annual or final project reports, or the project outcomes report, will delay NSF review and processing of any future funding increments as well as any pending proposals for all identified PIs and co-PIs on a given award. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project-reporting system, available through Research.gov, for preparation and submission of annual and final project reports. Such reports provide information on accomplishments, project participants (individual and organizational), publications, and other specific products and impacts of the project. Submission of the report via Research.gov constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report also must be prepared and submitted using Research.gov. This report serves as a brief summary, prepared specifically for the public, of the nature and outcomes of the project. This report will be posted on the NSF website exactly as it is submitted by the PI.

More comprehensive information on NSF Reporting Requirements and other important information on the administration of NSF awards is contained in the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) Chapter VII, available electronically on the NSF Website at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.

VIII. AGENCY CONTACTS

Please note that the program contact information is current at the time of publishing. See program website for any updates to the points of contact.

General inquiries regarding this program should be made to:

- Kenneth Moloy, CHE, telephone: (703) 292-8441, email: NSFDFG@nsf.gov
- Brandi Schottel, CBET, telephone: (703) 292-4798, email: NSFDFG@nsf.gov
- Markus Behnke, DFG/PC, telephone: 49 (228) 885-2181, email: NSF-DFG-Chemistry@dfg.de
- Ilka Paulus, DFG/PC, telephone: 49 (228) 885-2021, email: NSF-DFG-Chemistry@dfg.de
- Georg Bechtold, DFG/ING 1, telephone: 49 (228) 885-2818, email: NSF-DFG-Chemistry@dfg.de

For questions related to the use of FastLane or Research.gov, contact:

- FastLane and Research.gov Help Desk: 1-800-673-6188
FastLane Help Desk e-mail: fastlane@nsf.gov
Research.gov Help Desk e-mail: rgov@nsf.gov

For questions relating to Grants.gov contact:

- Grants.gov Contact Center: If the Authorized Organizational Representatives (AOR) has not received a confirmation message from Grants.gov within 48 hours of submission of application, please contact via telephone: 1-800-518-4726; e-mail: support@grants.gov.

All general NSF inquiries should be sent to NSFDFG@nsf.gov. All general DFG inquiries should be sent to NSF-DFG-Chemistry@dfg.de.

IX. OTHER INFORMATION

The NSF website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this website by potential proposers is strongly encouraged. In addition, "NSF Update" is an information-delivery system designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF [Grants Conferences](#). Subscribers are informed through e-mail or the user's Web browser each time new publications are issued that match their identified interests. "NSF Update" also is available on [NSF's website](#).

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this mechanism. Further information on Grants.gov may be obtained at <https://www.grants.gov>.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) is an independent Federal agency created by the National Science Foundation Act of 1950, as amended (42 USC 1861-75). The Act states the purpose of the NSF is "to promote the progress of science; [and] to advance the national health, prosperity, and welfare by supporting research and education in all fields of science and engineering."

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to academic institutions for basic research.

NSF receives approximately 55,000 proposals each year for research, education and training projects, of which approximately 11,000 are funded. In addition, the Foundation receives several thousand applications for graduate and postdoctoral fellowships. The agency operates no laboratories itself but does support National Research Centers, user facilities, certain oceanographic vessels and Arctic and Antarctic research stations. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

Facilitation Awards for Scientists and Engineers with Disabilities (FASSED) provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See the *NSF Proposal & Award Policies & Procedures Guide* Chapter II.E.6 for instructions regarding preparation of these types of proposals.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090 and (800) 281-8749, FIRS at (800) 877-8339.

The National Science Foundation Information Center may be reached at (703) 292-5111.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at <https://www.nsf.gov>

- **Location:** 2415 Eisenhower Avenue, Alexandria, VA 22314
- **For General Information** (NSF Information Center): (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**
 - Send an e-mail to: nsfpubs@nsf.gov
 - or telephone: (703) 292-7827
- **To Locate NSF Employees:** (703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies or other entities needing information regarding applicants or nominees as part of a joint application review process, or in order to coordinate programs or policy; and to another Federal agency, court, or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See [System of Record Notices](#), NSF-50, "Principal Investigator/Proposal File and Associated Records," and NSF-51, "Reviewer/Proposal File and Associated Records." Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

An agency may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a valid Office of Management and Budget (OMB) control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding the burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to:

Suzanne H. Plimpton
Reports Clearance Officer
Office of the General Counsel
National Science Foundation

Alexandria, VA 22314

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