NSF MPS-Chemistry Quarterly Office Hour:
Nuts and Bolts of the NSF Faculty Early Career Development (NSF CAREER) program

Chemistry Section (MPS-Chem)

Directorate for Mathematical and Physical Sciences

National Science Foundation

General Information about the NSF CAREER Program

The CAREER Solicitation: NSF 22-586

Supports early-career faculty who have the potential to serve as academic role models in research and education and to lead advances in the mission of their department or organization.

NSF CAREER Program:

This premier program emphasizes the importance the Foundation places on the early development of academic careers dedicated to stimulating the discovery process in which the excitement of research is enhanced by inspired teaching, enthusiastic learning, and disseminating new knowledge. Effective integration of research and education generates a synergy in which the process of discovery stimulates learning, and assures that the findings and methods of research and education are quickly and effectively communicated in a broader context and to a large audience.

The CAREER program embodies NSF's commitment to encourage faculty and academic institutions to value and support the integration of research and education. Successful Principal Investigators will propose creative, effective research and education plans, developed within the context of the mission, goals, and resources of their organizations, while building a firm foundation for a lifetime of contributions to research, education, and their integration.

CAREER Solicitation Specific Provisions

- **Title Page:**
  - ✓ Select CAREER for program solicitation (NSF 22-586)
  - ✓ Start your title with **"CAREER:"**
- **Project Description (*in addition to Intellectual Merit & Broader Impacts*):**
  - ✓ Description of **the proposed educational activities,** including plans to evaluate impact
  - ✓ Description of how **research and educational activities are integrated or synergistic**
- **Additional Documents:**
  - ✓ **Required: Department letter for CAREER Eligibility,** typically from the Chair stating that PI is eligible for a CAREER award.
- **Eligibility:**
  - ✓ **At least a 50% Tenure-Track** (untenured by submission deadline) **or a tenure-track-equivalent position as an Assistant Professor** (or equivalent title).
  - ✓ Additional eligibility requirements see NSF 22-586 for details.
  - ✓ **Three attempts** total are allowed, and no more than one award.

Upcoming Deadline: ***July 22, 2026***

Presidential Early Career Awards for Scientists and Engineers (PECASE)

- **MPS-Chemistry CAREER coordinator:**
  - ✓ Tingyu Li (tli@nsf.gov)
- **Eligibility**
  - ✓ **Nominated by NSF, from current NSF CAREER Awardees**
  - ✓ U.S. citizen, U.S. national, or U.S. permanent resident by the time of nomination
  - ✓ Keep program officer informed of your great work
  - ✓ Submit a well written first annual report including effort in educational plan
  - ✓ Publish high impact papers and show good productivity

Finding a Home for your Research Idea

The Research Idea

- A gap in knowledge or an unsolved problem
- An idea that challenges the dogma in a field
- A new, innovative solution to a “solved” problem
- An opportunity created by a new technology or another development in your field or in a related field
- A combination of existing ideas into a new idea

The research can be hypothesis-driven, discovery-driven, or a combination of both. In counterpoint, a “fishing expedition” is not a good idea.

The Research and Broader Impacts Ideas Should Fit You and Your Institution

- Talents
- Experience and insight
- Professional and personal interests
- Vision and goals for your first 5-10 years of your career
- Resources:
  - Existing: instrumentation, type of students, teaching and outreach resources, collaborators
  - Obtained using a CAREER award: student and postdoc support, materials, travel, etc.
  - Collaborators (include collaboration letters in the format prescribed by the NSF Proposal & Award Policies & Procedures Guide (PAPPG)

Finding a home for your research

- Proposals must be submitted to a **program** following Notice of Funding Opportunity (NOFO) guidance on submission deadlines.
- Read the program descriptions on the NSF web site, which is updated periodically.
- Read the award abstracts of what has already been funded by that program at NSF.
  - ✓ https://www.nsf.gov/awardsearch/
  - ✓ Select Advanced Search
  - ✓ Search for the "element code" for the program you're considering, then run the search
- If still unsure, send a white paper to ALL the Programs you think your research would fit for feedback.
- Pay attention to current funding priorities identified by NSF and the Administration

Programs will review proposals for fit within their program descriptions. Your proposal might be transferred to another program with a better fit.

Finding Out What a Program Has Recently Funded

Program events

Upcoming

May 8, 2026 - MPS Chemistry Quarterly Office Hours

August 14, 2026 - MPS Chemistry Quarterly Office Hours

November 13, 2026 - MPS Chemistry Quarterly Office Hours

Awards made through this program

Browse projects funded by this program

Map of recent awards made through this program

Organization(s)

Directorate for Mathematical and Physical Sciences (MPS)

Division of Chemistry (MPS/CHE)

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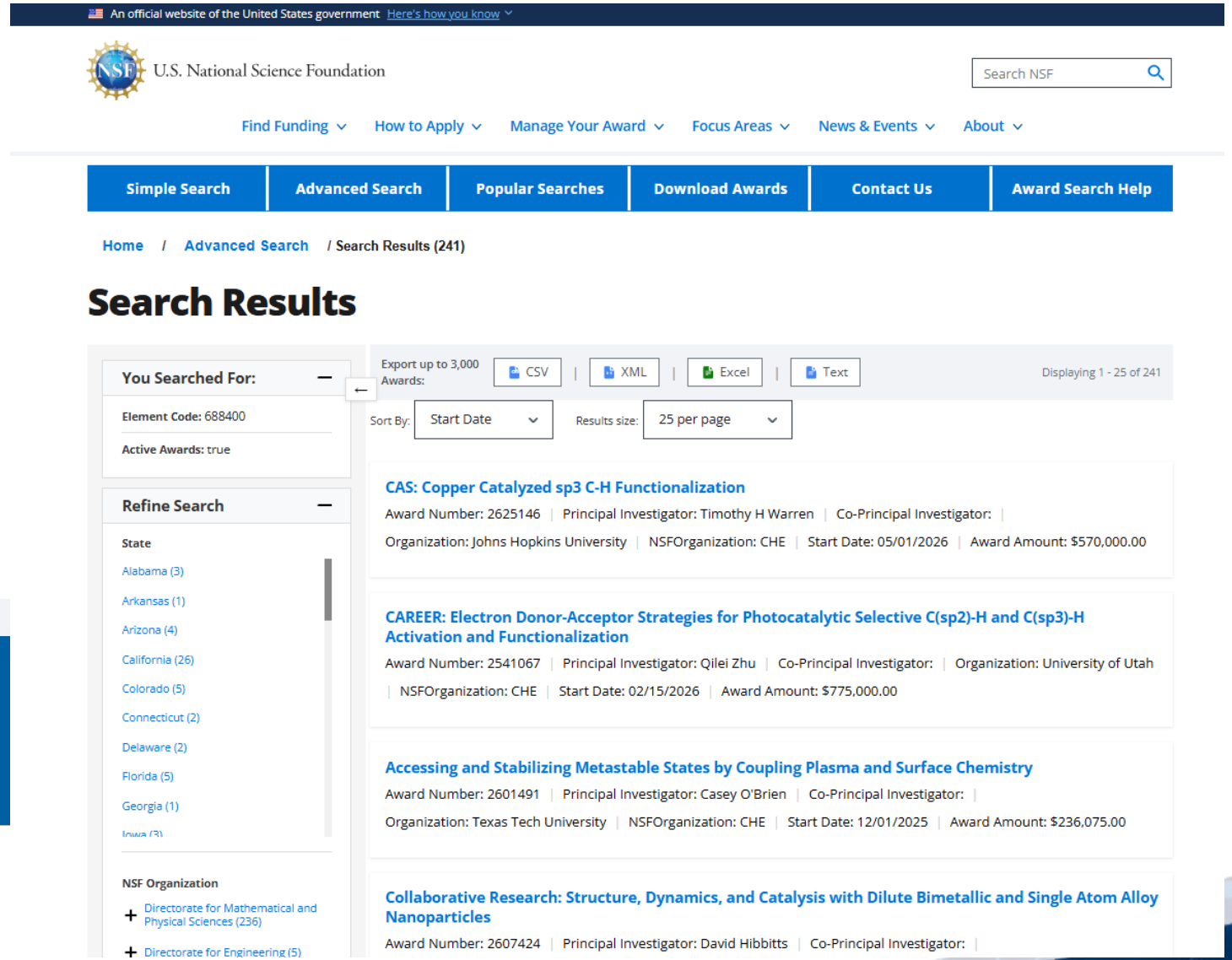
U.S. National Science Foundation

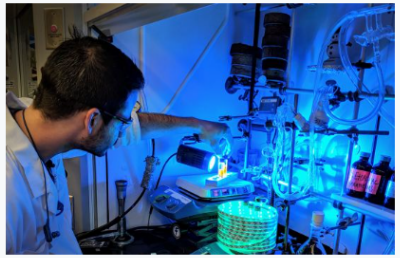
Randolph Building
401 Dulany Street
Alexandria, VA 22314
(703) 292-5111



MPS-Chemistry Program Contacts

Chemistry research programs

MPS invests in experimental and theoretical research across an array of chemistry research programs. The programs support individual researchers, small teams and interdisciplinary research spanning multiple programs.



Chemical Catalysis

Supports experimental and computational research directed towards the fundamental chemistry aspects of catalytic processes at the molecular and/or bond level of understanding.

Chemical Measurement and Imaging

Supports research and development of new measurement and chemical imaging tools that identify and quantify chemical substances, their properties and processes.

Chemical Mechanism, Function and Properties

Supports physical organic and physical inorganic chemistry research on the nature of chemical mechanism, function and structure property studies.

Chemical Structure and Dynamics

Supports experimental and applied computational physical chemistry research on the nature of chemical structure and bonding, electronic structure, and chemical dynamics.

Chemical Synthesis

Supports research that generates new fundamental knowledge and understanding of synthetic methodologies and the synthesis of complex and/or challenging chemical structures.

Chemical Theory, Models and Computational Methods

Supports the discovery and development of theoretical and computational methods or

https://www.nsf.gov/mps/chemistry

Home / Funding at NSF / Funding Search / Chemical Catalysis (CAT) Print

Important information for proposers and award recipients
All proposals must be submitted in accordance with the requirements specified in this funding opportunity and in the Proposal & Award Policies & Procedures Guide (PAPPG) and its supplements...

Supports experimental and computational research directed towards the fundamental chemistry aspects of catalytic processes at the molecular and/or bond level of understanding.

Synopsis

The Chemical Catalysis (CAT) Program supports experimental and computational research directed towards the fundamental chemistry aspects of catalytic processes at the molecular and/or bond level of understanding. The CAT Program accepts proposals on catalytic approaches which facilitate, direct, and accelerate efficient chemical transformations. The program scope includes the design and synthesis of catalytic species on the molecular, supramolecular, and nanometer scales and their relevant mechanistic studies. Bothhomogeneous or heterogeneous catalytic processes are in scope. The CAT Program encompasses (but is not limited to) the following areas: polymerization catalysis,

Program guidelines

Review full program guidelines and learn how to submit a proposal in the latest solicitation.

Read the solicitation NSF 22-605

Share

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Program contacts

Administrative Program Support: Renee Ivey, sivey@nsf.gov or (703) 292-4928.

Name	Email	Phone	Organization
Kenneth G. Moloy	kmoloy@nsf.gov	(703) 292-8441	MPS/CHE
Sen Zhang	szhang@nsf.gov	(703) 292-2746	MPS/CHE

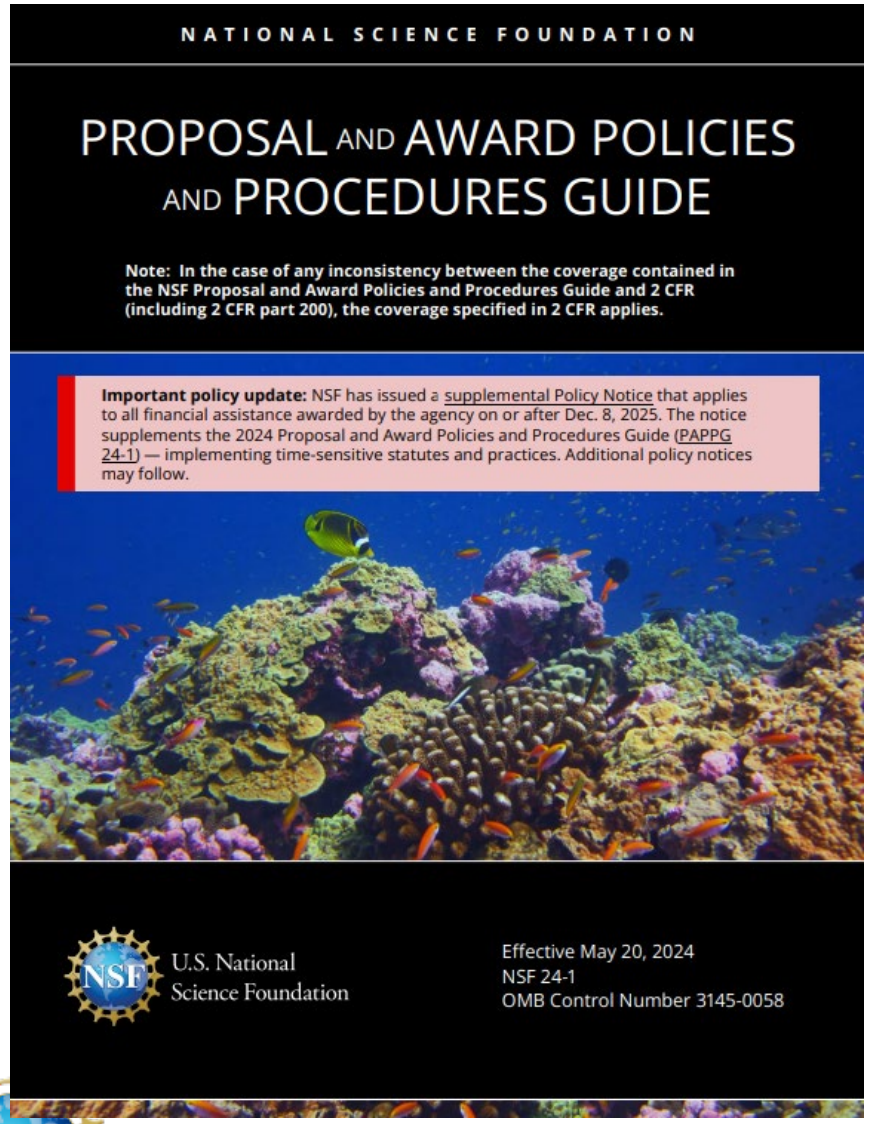
What Is Useful to Include in Whitepapers

- What is the research gap or need that you try to fill?
- What hypotheses will be tested? What experiments could disprove the hypotheses?
- Why are the efforts important/needed?
- What the expected innovations in chemistry are?
- How broadly applicable the research results would be to address similar or more advanced systems?
- Why do you think the project fits in the Program you are inquiring about?

The more specific this information is, the better it is.
Feel free to include references.
Please limit the white paper to 1-2 pages.

Unwritten Wisdom for Proposal Preparation

PAPPG: Instructions for Proposal Prep



Sets forth…

- NSF's proposal preparation and submission guidelines
- NSF polices and procedures regarding the award, administration, and monitoring of a Foundation's awards

(Some) Recent Changes

- Biographical sketches to be prepared through use of SciENcv
- Synergistic Activities are now uploaded as a separate document
- Mentoring Plan required for postdoctoral researchers and/or graduate students supported on the project

Remember to check the **Summary of Changes to the PAPPG section**, as well as the **PAPPG website** for updates.

Policy changes will be posted on the website until such a time that the PAPPG itself can be updated.

NSF's Two Merit Review Criteria

- **Intellectual Merit** – *potential to advance scientific knowledge*
- **Broader Impacts** – *potential to benefit society and contribute to the achievement of specific, desired societal outcomes*

CAREER requirement: ***Integration of Research and Education***

- Should describe an integrated path that will lead to a successful career as an outstanding *researcher and educator*
- NSF recognizes that there is no single approach to an integrated research and education plan
- Think creatively, and place within context of discipline and institution

Five Elements for Both Criteria

This is the information the reviewers are looking for!

- **Right Idea:** 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)?
- **Right Idea:** To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
- **Right Plan:** 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?
- **Right Person:** How well qualified is the individual, team, or organization to conduct the proposed activities?
- **Right Place:** Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

The Research Objective

It is useful to clearly and concisely communicate early in the Project Summary and Project Description **the research objective statement of what you intend to find out that is not already known**.
This is probably the hardest to write part of the proposal.

Doing it right:

- Begin: "The research objective of this project is…"
- **Be concise**: 25 words or less
- Be sure your statement is comprehensible
- Be sure your **objective can be answered by a sequence of experimental and/or computational studies outlined in the proposal**
- **Put it up front**—page one, paragraph one
- This is not a weather report or state-of-the-union address

The Project Description

Must be clear, easy to follow, by a reader.
Be self-contained and give the reviewers enough information to review it
Use sections, titles, figures etc. to ensure this is the case. Below is just an example.

Introduction: Overview and Objectives

- One-page executive summary that is engaging and memorable
- Outline basic rationale, specific objectives, expected outcomes, and why the research may have a transformative effect on your field of science
- Explain how the research and education plans are integrated
- Mention other broader impacts activities

Research Plan: Background and Significance

- Describe the scientific background for the research with appropriate (not encyclopedic) citations
- Write for an audience of general reviewers
- **Why is the scientific problem important? What is the state of the art in this field?**
- **How will the proposed research contribute to the agency's priority topic areas, such as AI, QIS, Biotechnology, and advance manufacturing?**
- Convince reviewers that you know the field well
- Guide your readers to the questions your planned research will answer

The Project Description

Research Plan: Preliminary Results

- The perceived risk of the research can be significantly reduced by preliminary, proof of concept results. Leave out half-baked results
- *Be careful where you publish!*

Research Plan: Proposed Research

- The plan to accomplish research objectives should be **logical and well-organized**
- Write with a confident voice but avoid hyperbole and technobabble
- Include the appropriate literature citations
- Use graphics as appropriate to illustrate your plans
- Strategic subheadings help break up blocks of text and guide the reader
- This section *may* include an approximate timeline for your research

Research Plan: Expected Outcomes and Significance

- What results do you expect? How will the results help you plan the route forward? What is your plan B? If your research is successful, why will it be significant?

The Project Description

Broader Impacts

NSF values the advancement of scientific knowledge and activities that contribute to the achievement of outcomes that have a positive impact on the society.

Broader impacts may be accomplished through:

- The research itself
- Activities that are directly related to specific research projects, AND/OR
- Activities that are supported by, but complementary to the project.

In the proposal:

- **State the goal (benefit to society).**
- **Have a clear plan to achieve the goal.**
- **Include an assessment plan.**

Note that NSF's broadening participation activities must aim to create opportunities for all Americans everywhere.
(https://www.nsf.gov/updates-on-priorities)

More information available at: https://www.nsf.gov/funding/learn/broader-impacts

The Project Description

Relationship to the PI's Long-Term Career Goals

- How do your efforts in research and education fit into your long-term game plan? Tell your story here.
- This can be interwoven through the proposal, but it may be better to have a separate section. This section can come earlier in the proposal

Summary

- A well written paragraph (or two) that knits together the elements of your proposal. Some PIs leave this out – but a good book has an ending to leave the reader feeling like their reading time was well spent.

References

- Use citation management software
- Don't forget to include titles for references
- DOIs or URLs are optional
- Most PIs use a numbered rather than an alphabetical list. Go with the norm in your field.
- This section should be up-to-date when you submit the proposal.
- No page limit.

Do NOT provide parenthetical information in the references.

DOs

- Make sure you are applying to the right NSF program.
- Share with your collaborators the part of the proposal that describes collaborative work and seek their feedback.
- **Make sure your chair letter is ready to go.**
- Your proposal is easy to read and understand.
- Use figures and schemes appropriately and strategically. (They should make a point.)
- Your proposal looks professional.
- Keep backup copies in a safe place.
- **Seek examples of proposals from CAREER awardees.**
- Involve your students in preparation.
- **Ask more experienced colleagues to critique your proposal.**
- Work with the Office of Sponsored Research or other Offices that support research at your Institution to help edit and improve your draft.
- Work with the Office of Sponsored Research on budget, deadlines etc. They will submit your proposal.

DON'Ts - It Is All About a Good Balance

- Wait until last minute and rush to get the proposal submitted
- Ignore "Breadth and Depth"
  - Make the proposed work too broad
  - Make the proposed work too narrow
  - Leave out essential details
  - Make it overly technical
- Have an unrealistically large or small budget
- Ignore rules and formatting parameters
- Make figures too small or have them placed at random

Common Flaws in Proposals

- Poor writing, presentation, organization, or use of graphic images. Proposal written for the wrong audience. Core ideas not describe early and clearly.
- A core idea that appears incremental rather than transformative.
- Missing key references, which is a failure to demonstrate deep knowledge of the field.
- Obvious mistakes in the science. All it takes is one sharp-eyed reviewer to sink a proposal.
- Lack of preliminary “proof of concept” results or publications.
- Failure to convince reviewers that you will succeed and become a significant player in this field of science.
- **An education plan that is not integrated with the research.**
- Missing or poorly developed broader impacts.

A Checklist

You Should Convince Reviewers that…

- ✓ You have chosen and developed an interesting and important scientific problem that is appropriate for a specific program at NSF.
- ✓ You have mastered the scientific background.
- ✓ You have mastered the tools you will need or found collaborators who could help with needed tools.
- ✓ You have clear objectives that will be attained by a solid plan A or, if necessary, by plan B.
- ✓ There is a healthy component of scientific discovery.
- ✓ Your plan is commensurate with five years of support.
- ✓ There is a very good chance you will succeed.
- ✓ Your proposed research is **NOVEL, CREATIVE, ORIGINAL, IMPACTFUL** and potentially **TRANSFORMATIVE**.
- ✓ Your education plan is **INNOVATIVE, SYNERGISTIC** with your research, and of appropriate **SCOPE**.
- ✓ You will be an effective mentor to your students.
- ✓ Your research/education/mentoring/etc. will have broader impact.
- ✓ You are ready to have a CAREER award launch your career.