

NSF CAREER Program: Perspectives on the CAREER Proposal



*Carole J. Read,
Directorate for
Engineering
ENG CAREER Workshop
April 1-2, 2020*

Workshop Agenda

Day 1:

- Opening Plenary and Q/A
- Reflections from Recent CAREER Awardees and Q/A
- Break
- Mock Panel Sessions
- Insights from Mock Panels and Q/A

Day 2

- Plenary: Life as an Assistant Professor and Q/A
- Seminar Sessions with Q&A
 - Integration of Education and Research – Is This Important?
 - Is My Research Topic Cohesive & Appropriate for the ENG CAREER Directorate?
 - When to Submit & Strategies for Declinations
 - Effective Project Summaries & Project Description Introductions



Plenary Outline

- What is the CAREER program?
 - Your Strategic Plan for your career
- Finding a program home
 - Identifying a Research Topic & Objective
- Review criteria & process
- Summary



Support for New Investigators

- The Faculty Early-Career Development (CAREER) program is one of many NSF funding opportunities for new investigators
- All NSF programs support new investigators as part of regular (“core”) research competitions
- More than 33% of research proposals submitted to NSF are from new (not previously NSF-funded) investigators
- Approximately 20% of the research proposals from new investigators are submitted to the CAREER Program



Faculty Early Career Development (CAREER) Program (NSF 20-025): Goals

- “A Foundation-wide activity that offers the National Science Foundation’s most prestigious awards in support of 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.**”
- “Activities pursued by early-career faculty should **build a firm foundation for a lifetime of leadership in integrating education and research.**”



CAREER Program

- Read the solicitation **NSF 20-025** and **FAQs**
- Due date: July 27, 2020 For **EVERYONE** (fourth Monday in July thereafter)
- Project duration: 5 years
- Your proposal must be compliant with all requirements of the current NSF Proposal and Award Policies & Procedures Guide **PAPPG 20-1**
- Look out for NSF-wide CAREER webinar in mid-May

https://www.nsf.gov/pubs/policydocs/pappg20_1/nsf20_1.pdf



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Faculty Early Career Development Program (CAREER) Includes the description of NSF Presidential Early Career Awards for Scientists and Engineers (PECASE)

Available Formats: HTML | PDF
Document Type: Program Announcements & Information View Program Page
Document Number: nsf17537



NSF 20-025 Revision Notes

- PI needs to meet eligibility criteria as of the annual deadline
 - Clarification regarding minimum percentage appointment for eligibility to the program (50%)
 - Only one annual deadline applies to all CAREER submissions
-
- Eligibility requirements have been revised to clarify the required early-career status of applicants.
 - Support for senior personnel other than the PI that is commensurate with a limited collaborative role in the project is now allowed in the budget of the proposal or of a sub recipient.



Investigator Eligibility Criteria

- Hold a doctoral degree by proposal deadline
- Be untenured and employed in an at least 50% tenure-track (or tenure-track-equivalent) assistant professor (or equivalent title) position at an eligible institution as of the annual deadline
- Have both research and educational responsibilities at the eligible institution
- Have not previously received a CAREER award
- Have not had more than two CAREER proposals reviewed previously



CAREER or Regular proposal?

- CAREER proposals are *single-PI* projects that include research and education activities that are integrated, innovative, and ambitious
- CAREER proposals require a letter of support from the Department Chair
- The CAREER program's aims are lofty – CAREER awards are a lot of work
- Are you at the right stage in your career to undertake the commitments of a CAREER award?
- Have you discussed your ideas with mentors / peers / program officers?
- Have you demonstrated commitment to both research and education?



CAREER Proposal Ingredients

- An integrated plan for research and education, ambitious but feasible
- Compelling argument that project will achieve effective integration of or synergy between research and education activities
- Departmental Letter demonstrating commitment to the career development of the investigator
- Letters of Collaboration (not of support or endorsement) when appropriate
- A budget that is consistent with the scope of the research and education activities



CAREER Project Budgets for ENG

- Read the solicitation **NSF 20-025** and **FAQs**; follow **PAPPG 20-1**
- CAREER budget requests should reflect the scope of the research and education plans, and the practices within your discipline
- For ENG, the minimum CAREER award size is expected to be \$500,000, including indirect cost or overhead, **for a 5- year period**
- Final budgets are negotiable if selected for award
- Consider sufficient financial support for you as a PI and for a graduate student



Considerations for Collaborators

- No Co-PIs allowed
- Senior personnel and collaborators are permitted including for evaluation and assessment
- Senior personnel can be in the project budget; their role should be limited
- Budget for evaluation can be included
- Collaborative arrangements of significance should be documented through letters of collaboration and should follow PAPPG 20-1 guidelines



CAREER: Department Chair Letter

- A letter from a department chair or equivalent organizational official is required; refer to requirements in the CAREER solicitation
- An indication that the PI's CAREER activities are supported by and integrated into the goals of the Dept. and organization and the Dept. is committed to the support, mentoring and professional development of the PI
- A description of the relationship between the CAREER project, the PI's career goals and job responsibilities, and the goals of his/her department/organization
- Verification of the PI's self-certified CAREER eligibility



Your Strategic Plan

- A strategic plan has three parts:
 - Where are you today?
 - Where do you want to be in the future (5, 10 years from now)?
 - How do you get from here to there?
- Questions: What do you want to leave as your career legacy? Do you need to work on important problems?



A strategic plan should...

- Build on your strengths
- Differentiate this proposal from your Ph.D. thesis work and other sponsored work
- Distinguish your research project from others in the field



Your Proposal

- Should advance you along your strategic plan
 - Should be a steppingstone to the next thing
- Should be compatible with your institution's goals
- Should represent a contribution to society at large



Be aware ...

The CAREER award is not a research award.

The CAREER award is a career development award.

Your proposal must reflect this focus.

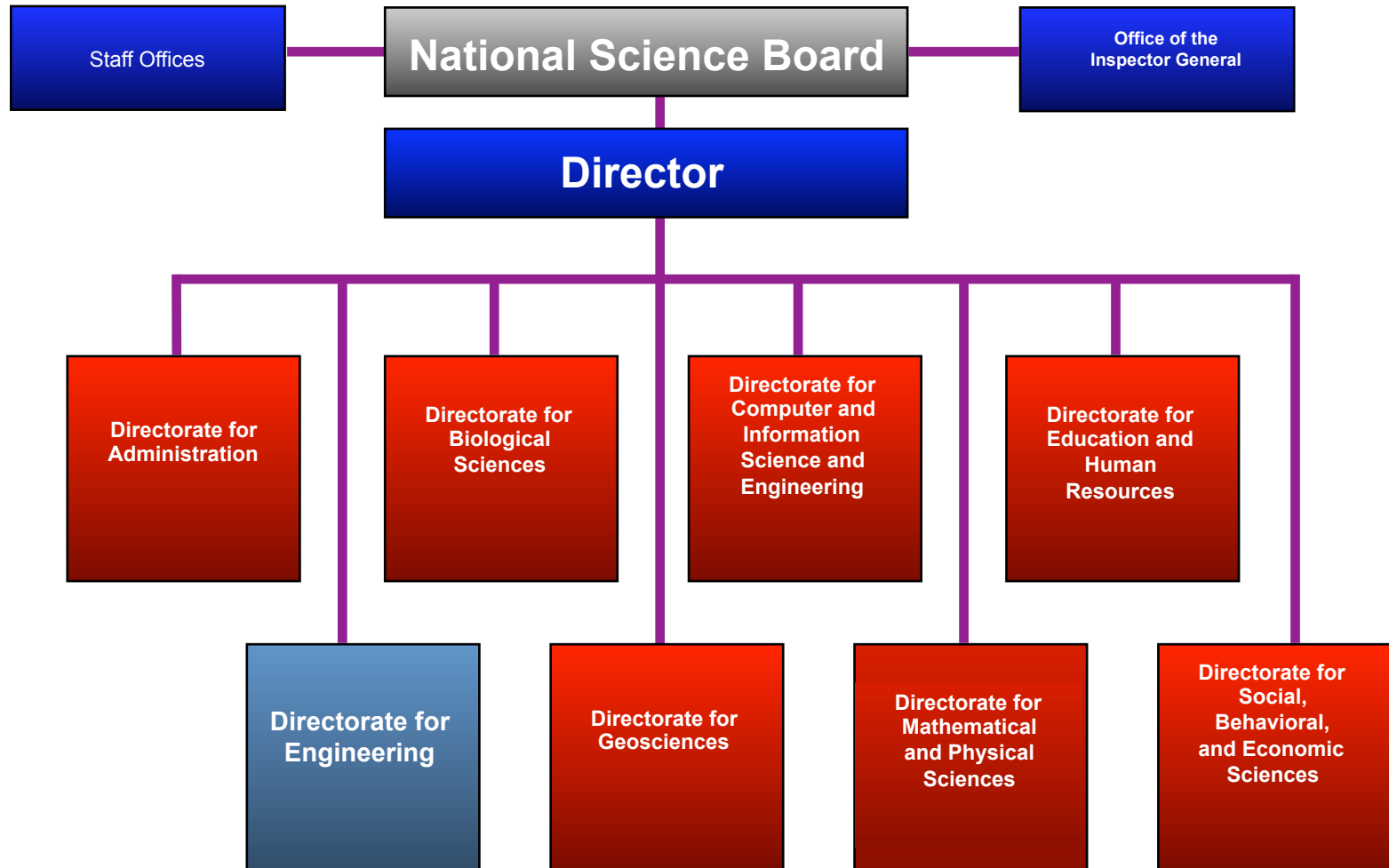


Finding a research home

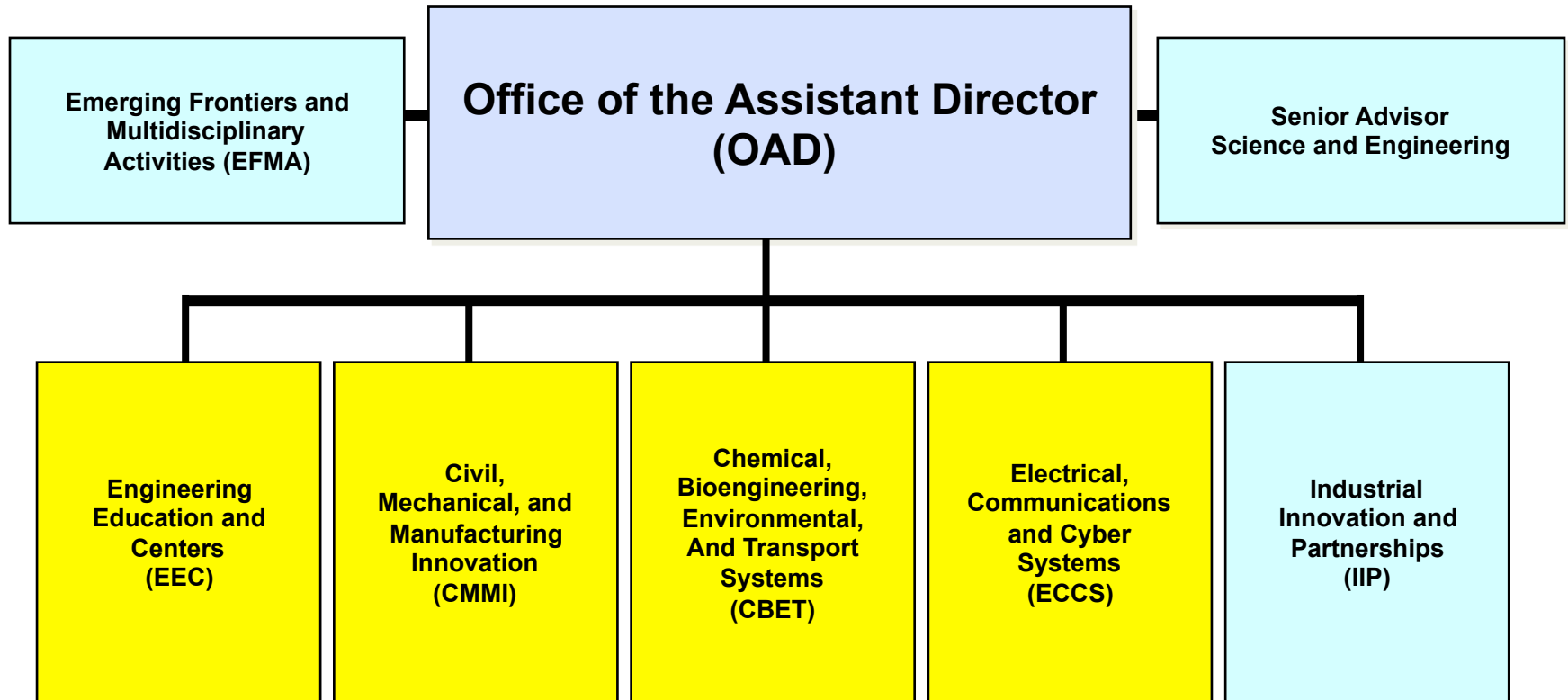
- Are you proposing scientific research?
- No?
 - Look for support from other sources
- Yes?
 - Your research objective determines the NSF program fit, not the application of your research results.
- Be prepared to answer the question: “What is your research objective?” in 25 words or less



NSF is Organized Around Research Topics



ENG Organization



The Next Step: You submit to a program

- Look at NSF's web site: www.nsf.gov
 - Check out research programs
 - Read what research topics they support
 - Abstracts for recent awards
 - Workshop reports



Award Search Capabilities

NSF Award Search: Advanced Search - Internet Explorer
https://www.nsf.gov/awards/...
File Edit View Favorites Tools Help
Play Daily Crossword - Th... Log In - NSF Wiki Home - Executive Devel... IPA Performance Manage... Microsoft Forefront TMG Employee Express - Home... Suggested Sites

Awards Advanced Search

[Overview of Award Search Features](#)

Awardee Information

| | | | |
|---|----------------------|--------------|----------------------|
| Principal Investigator First Name | <input type="text"/> | Organization | <input type="text"/> |
| Principal Investigator Last Name | <input type="text"/> | State | Select one |
| <input type="checkbox"/> Include Co-Principal Investigator in name search | | Zip Code | <input type="text"/> |
| | | Country | Select one |

Program Information

| | | | |
|------------------|--|--|----------------------|
| NSF Organization | Select one | HINT: The "Program" box searches both program element and program reference names and codes. | Program |
| Element Code | <input type="text"/> | | |
| Reference Code | <input type="text"/> | Program Officer | <input type="text"/> |
| | <input type="radio"/> Any <input checked="" type="radio"/> All | | |
| | <input type="radio"/> Any <input checked="" type="radio"/> All | | |

Additional Information

| | | | | |
|--|----------------------|---|----------------------|----------------------|
| Keyword | <input type="text"/> | HINT: Data prior to 1976 may be less complete. | | |
| <input type="checkbox"/> Search Award Title Only | | <input checked="" type="checkbox"/> Active Awards <input type="checkbox"/> Expired Awards | | |
| Award Number | Select one | Original Award Date | From | To |
| | | Select one | <input type="text"/> | <input type="text"/> |
| Award Amount | Select one | Start Date | From | To |
| Award Instrument | Select one | Select one | <input type="text"/> | <input type="text"/> |
| | | End Date | From | To |
| | | Select one | <input type="text"/> | <input type="text"/> |

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Award Data

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Award Abstract #1553815

CAREER: Surface Texturing of Bulk Metallic Glasses for Fabrication of Complex Micro Optics

| | |
|-----------------------------------|--|
| NSF Org: | CMMI Div Of Civil, Mechanical, & Manufact Inn |
| Initial Amendment Date: | January 4, 2016 |
| Latest Amendment Date: | January 4, 2016 |
| Award Number: | 1553815 |
| Award Instrument: | Standard Grant |
| Program Manager: | Steven R. Schmid CMMI Div Of Civil, Mechanical, & Manufact Inn ENG Directorate For Engineering |
| Start Date: | April 1, 2016 |
| End Date: | March 31, 2021 (Estimated) |
| Awarded Amount to Date: | \$500,000.00 |
| Investigator(s): | Xiaoliang Jin xiaoliang.jin@okstate.edu (Principal Investigator) |
| Sponsor: | Oklahoma State University 101 WHITEHURST HALL Stillwater, OK 74078-1011 (405)744-9995 |
| NSF Program(s): | CAREER: FACULTY EARLY CAR DEV, Manufacturing Machines & Equip, EXP PROG TO STIM COMP RES |
| Program Reference Code(s): | 082E, 083E, 1045, 1468, 9150 |
| Program Element Code(s): | 1045, 1468, 9150 |

ABSTRACT



Award Abstracts

ABSTRACT

This Faculty Early Career Development (CAREER) grant will provide fundamental understanding of a novel technique to fabricate complex micro optics through generating surface textures on bulk metallic glasses. Micro optics with surface textures play a significant role in broad applications, such as automotive illumination systems, high-resolution display panels, diffraction gratings for laser systems, and reflective mirrors for traffic safety. Bulk metallic glasses have been increasingly used in fabricating micro optics due to high hardness, high corrosion resistance and no surface defects. However, micro optics produced with existing techniques using bulk metallic glasses usually have high fabrication cost, limited geometric accuracy and surface quality due to thermal deformations of the material. This Faculty Early Career Development (CAREER) award supports fundamental research of a novel technique to fabricate complex micro optics through generating surface textures on bulk metallic glasses by diamond machining with applied vibrations. The new technique will significantly reduce production cost, and improve component quality (both geometric accuracy and surface roughness). The award also supports activities to integrate research results into education, expose the public to precision manufacturing and optics engineering, and prepare next-generation engineers in advanced manufacturing areas.

In the new technique, the planar vibration of the workpiece causes intermittent tool-workpiece contact, resulting in high-frequency variations of temperature and stress in material removal region. The first research



We encourage you to contact Program Directors

- Email the appropriate program officer(s) and ask if your research project fits their program, contact sequentially
 - One page summary (preferred)
- Your program director can:
 - Confirm program fit
 - Explain the review environment for the proposal
 - Give advice on common proposal preparation errors
 - Help you understand the review of a previous proposal
 - Point you to resources you can use to help write a better proposal next time
 - Give general guidance on good proposal writing



Questions You Shouldn't Ask a Program Director

- Will you fund my research?
- Is NSF interested in my topic?
- What hypothesis should I use?
- What research topic do you think I should work on?
- What is your program's funding rate?
- If I send a copy of my proposal to you, will you help me edit it?
- This is my last chance, what can I do?



CAREER Proposal Review Considerations

- The **Intellectual Merit** is the potential that your research has to advance the knowledge base of the field of science or engineering.
- The **Broader Impacts** focus on the potential benefit to society and achievement of desired societal outcomes.
- The **Integration of Research and Education** describes the reciprocal relationship between the proposed research and education activities and how they may inform each other in their career development as both outstanding researchers and educators.



Intellectual Merit

- The Intellectual Merit is the potential that your research has to advance the knowledge base of the field of science or engineering
- Questions:
 - What is already known?
 - What is new?
 - What will your research add?
 - What will this do to enhance or enable research in your or other fields?
- Why is your research important for the advancement of your field?



Broader Impacts

- The Broader Impacts focuses on the potential benefits of the research and the educational outcomes to society and achievement of desired societal outcomes
- Means to benefit society include:
 - Economic/environment/energy
 - Education and training
 - Providing opportunities for underrepresented groups
 - Improving research and education infrastructure

The key issue is how your research results will be applied — why would the general public care?



Five Key Review Elements for both IM/BI

1. What is the potential for the proposed activity to:
 - **advance knowledge** and understanding within its own field or across different fields (Intellectual Merit); and
 - **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 institution to conduct the proposed activities?
5. Are there adequate **resources** available to the PI (either at the home institution or through collaborations) to carry out the proposed activities?



Integration of Education and Research

- All CAREER proposals must have an integrated research and education plan at their core
- No single approach: NSF encourages all applicants to think creatively about how their research will impact their education goals and, conversely, how their education activities will feed back into their research
- Provide well-argued and specific activities that will, over a 5-year period, build a firm foundation for a lifetime of contributions to research and education



Integration of Research and Education

- Think creatively about the reciprocal relationship between research and education activities and how they may inform each other in your career development
- Plans should reflect your own disciplinary and educational interests and goals, as well as the needs and context of your organization
- There are different expectations within different disciplinary fields – a wide range of research and education activities may be appropriate for the CAREER program
- Some investigators may wish to pursue an additional activity such as entrepreneurship, industry partnerships, or policy that enhances their research and education plans
- See the CAREER program solicitation for thought-provoking examples
- Communicate with the CAREER contact(s) in the Division(s) closest to your area of research to discuss expectations



Assessment and Evaluation

- PIs are strongly encouraged to describe how the impact of the educational activities will be assessed or evaluated
 - Helpful document: NSF publication 02-057, *The 2002 User Friendly Handbook for Project Evaluation*



CAREER Proposal Review Process

- ENG has dedicated CAREER review panels
- Typically 4 reviews submitted before the panel and all proposals are discussed by the panel
 - All reviews and Panel Summary will be released to PI
- Panelists are senior academic researchers with broad expertise to fit topics of proposals
- No quotas for # awards for a given program
- No threshold in terms of mean rating



Take home: Proposal Basics

- Write to the reviewers (not to PD and not to yourself)
- Your proposal will be judged by the reviewers
- Reviewers need to know just a few things:
 - What is it about (the research objective)?
 - How will you do it (the technical approach)?
 - Can you do it (you and your facilities)?
 - Is it worth doing (intellectual merit and broader impacts)?
 - Will the effort provide a firm foundation for your career plans (integration of education and research)?
- This is, basically, all the proposal needs to convey – but it needs to convey this



Important Concept

**The reviewers read your
proposal, not your mind**



Volunteer to Be a Reviewer

- Proposal review is an important service to your community
- There's no better way to see how the system works
- There's no better way to understand what makes a proposal compelling

- Email program officer your 2-page biosketch
- In email ask to be a reviewer and give key words of your expertise area





QUESTIONS ?

