

DMR – Update
2023
*Where Materials
Begin and Society
Benefits*



Linda Sapochak, Division Director
Division of Materials Research
Mathematical & Physical Sciences



MRSEC Director's Meeting, January 19, 2023

NSF'S MISSION

To promote the progress of science; to advance the national health, prosperity, and welfare; and to secure the national defense.

Director's Vision



 <p>Advance the frontiers of research into the future</p>	 <p>Ensure accessibility and inclusivity</p>	 <p>Secure global leadership</p>
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We are in a **DEFINING MOMENT**

-  Intensity of global competition
-  Urgent need for domestic talent
-  Broad support for science as path for solving global grand challenges

We can accomplish this vision with:

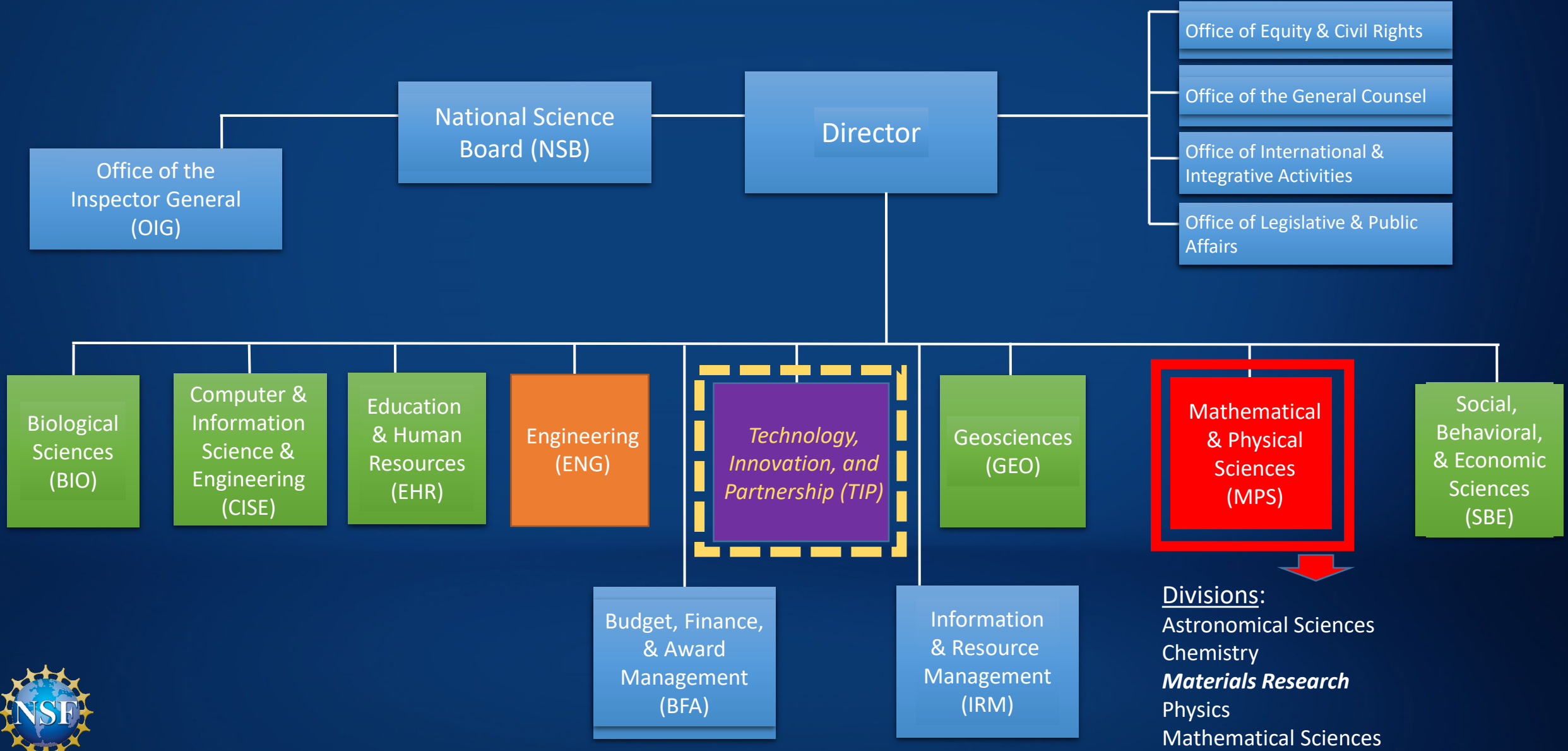
SPEED AND SCALE



Dr. Sethuraman Panchanathan, NSF Director



National Science Foundation Organization



[Home](#) / [News](#) / [Statement by Director Sethuraman Panchanathan on the NSF Fiscal Year 2023 appropriations](#)

NSF News

Statement by Director Sethuraman Panchanathan on the NSF Fiscal Year 2023 appropriations

December 23, 2022

The landmark bipartisan CHIPS and Science Act enacted earlier this year set out a bold vision for the future of the U.S. National Science Foundation (NSF) that sought to strengthen NSF's support of fundamental research, engage the missing millions not currently reached by our nation's STEM enterprise, and accelerate the translation of new technologies from the lab to the market. The historic investment provided in the FY23 appropriations puts NSF on a trajectory to realize that vision. The \$9.9 billion budget represents an increase of 12 percent in NSF's research and related activities and a 36 percent increase in NSF's education and training programs, the largest dollar increase of all time and the largest percentage increase in more than two decades. This critical investment in American science, innovation, and the workforce will help lay a strong foundation for shared growth and prosperity for generations to come.

I am grateful to the Biden-Harris Administration and Congress for their continued support of NSF's mission, so vital to our economic and national security. I look forward to continuing to work with the White House and Congress to ensure that we remain at the forefront of discovery and innovation by unlocking innovation anywhere and opportunities everywhere across the United States.

Research areas

[Office of the Director \(OD\)](#)

..."\$9.9 billion, a historic \$1.036 billion, or 12 percent, increase above the fiscal year 2022 enacted level. This is largest dollar increase for NSF of all time and the largest percentage increase for the Foundation in more than two decades."

Bottomline: DMR's budget is expected to be flat – increases will need to align with national priorities.

A lot of focus on new partnerships, workforce development and facilitating translation.

The MRSEC Program – A Brief History in Time

ARPA establishes
Interdisciplinary
Research Labs

1960

NSF establishes
DMR, Materials
Research Labs

1972

DMR establishes
MRSEC

1994

2023 + ?

1971

IDLs move
to NSF

1984

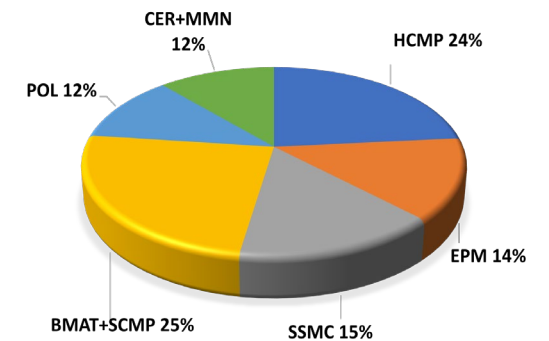
DMR establishes
Materials Research
Groups



Mansfield Amendment (1969)
prohibited military funding of
research that lacked relationship
to specific military function.

NSF may pick up ARPA's interdisciplinary laboratories,
[Physics Today, Feb. 1971.](#)

Currently:
19 MRSECs exist in 12 states



<https://mrsec.org/research>

<https://www.nsf.gov/funding/programs.jsp?org=DMR>



TIP Directorate and Materials Research Opportunities: Convergence Accelerator Program

NSF Convergence Accelerator Phases 1 and 2 for the 2022 Cohort - Tracks H, I, J

PROGRAM SOLICITATION NSF 22-583



National Science Foundation

Directorate for Technology, Innovation and Partnerships

Letter of Intent Due Date(s) (required) (due by 5 p.m. submitter's local time):

June 01, 2022

Letter of Intent (required for Phase 1 Full Proposals only)

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

July 20, 2022

Phase 1 Full Proposals

August 29, 2023

Phase 2 Full Proposals, only Phase 1 awardees are eligible to apply

Track I: Sustainable Materials for Global Challenges

The objective of the NSF Convergence Accelerator's Track will be to converge advances in fundamental materials science with materials design and manufacturing methods in an effort to couple their end-use and full life-cycle considerations for environmentally- and economically-sustainable materials and products.





NSF News

NSF advances sustainable materials solutions and capabilities

NSF's Convergence Accelerator invests \$11.5 million on 16 multidisciplinary teams to advance the circular economy.

December 19, 2022

The U.S. National Science Foundation is accelerating convergence research across materials discovery and development as well as production and manufacturing to address challenges aligned to the manufacturing, reuse and recycling of critical materials and products.

With a total investment of \$11.5 million, 16 Phase 1 multidisciplinary teams have been selected for NSF's Convergence Accelerator program's Track I: Sustainable Materials for Global Challenges. Australia's national science agency, [Commonwealth Scientific and Industrial Research Organisation](#), or [CSIRO](#), is also contributing and will fund Australian researchers to participate on two U.S. projects.

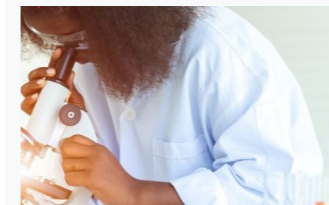
The world is dependent on critical materials for every aspect of life and work. These materials are integral to energy, infrastructure, healthcare, economic development and national security. Approaches that consider a "circular economy" for materials are essential for the sustainable design of these materials and are intended to capture the full life cycle through their use in applications

Share



<https://beta.nsf.gov/news/nsf-advances-sustainable-materials-solutions>

Related stories



➤ [New NSF program seeks to engage minority-serving institutions in artificial intelligence research](#)



TIP Directorate and Materials Research Opportunities: Regional Innovation Engines (RIE) Program

NSF Regional Innovation Engines (NSF Engines)

Frequently Asked Questions (FAQ)
(Publication Date: August 4, 2022)

Examples of possible topics:

Circular Bioeconomy
Climate Change Resilience
Sustainable Materials*
Semiconductors and Post-Silicon Technologies

*Sustainable Polymers Square Table Report:
<https://chemrxiv.org/engage/chemrxiv/about-information?show=about-site>

Please see:

<https://beta.nsf.gov/tip/latest>

A unique program to grow and sustain regional innovation:



➤ Robust partnerships

Deep collaborations across a wide range of partners, including industry, academia, government, nonprofits, civil society and communities of practice.



➤ Accountable leadership

Strong, CEO-led organization with accountability to a governance board, regional stakeholders and NSF.



➤ Regional economic impact

Co-design and co-creation of R&D and translation activities with direct impact on the end users in the Engine's region of service.



➤ Culture of innovation

A nimble organization that engages in use-inspired R&D that adapts to changing societal and economic needs.



➤ Inclusion at all levels

Diversity, equity, inclusion, and accessibility, or DEIA, are intentionally and meaningfully embedded at all levels in leadership, R&D, and workforce development activities.



➤ Comprehensive workforce development

Workforce development initiatives to train and educate technicians, researchers, practitioners, and entrepreneurs to meet regional workforce needs.

Directorate for Technology, Innovation & Partnership (TIP)

TIP Programs

- [America's Seed Fund](#)
- [Convergence Accelerator](#)
- [Enabling Partners to Increase Innovation Capacity](#)
- [Experiential Learning for Emerging and Novel Technologies](#)
- [Innovation Corps \(I-Corps™\)](#)
- [Partnerships for Innovation](#)
- [Pathways to Enable Open-Source Ecosystems](#)
- [Regional Innovation Engines](#)

Please see:

<https://beta.nsf.gov/tip/latest>

How can successful MRSEC IRGs transition into one of these programs ?



Materials Research Science and Engineering Centers (MRSEC)

PROGRAM SOLICITATION NSF 21-625

REPLACES DOCUMENT(S): NSF 19-517



National Science Foundation

Directorate for Mathematical and Physical Sciences
Division of Materials Research



National Science Foundation
M R S E C
MATERIALS RESEARCH SCIENCE AND
ENGINEERING CENTERS

Preliminary Proposal Due Date(s) (required) (due by 5 p.m. submitter's local time):

June 21, 2022

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

November 22, 2022

By invitation only

IMPORTANT INFORMATION AND REVISION NOTES

1. New priority areas for DMR are listed, including topical areas that broaden the portfolio of the MRSEC Program; high-risk/high-impact research proposals and proposals addressing topical areas of national importance will be given priority.
2. Proposals must address a limited number of well-chosen education and outreach activities, and delineate a targeted roadmap to address a single, clear, and measurable goal, with long-term verifiable impact that extends beyond the Center itself.
3. Proposers no longer need to identify the main topical materials research program that aligns with each proposed Interdisciplinary Research Group.
4. Additional proposal-preparation requirements have been included related to the Data Management Plan. Accompanying reviewer guidance is provided on evaluating Data Management Plans.
5. Minor clarifying changes in wording have been made in Sections II-V.

Any proposal submitted in response to this solicitation should be submitted in accordance with the revised *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) (NSF 22-1), which is effective for proposals submitted, or due, on or after October 4, 2021.



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Koller

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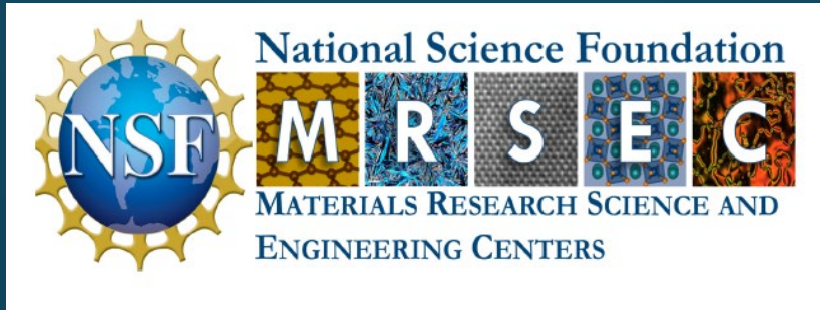
Encouraged:

- Purely theoretical and/or computational
- AI/ML
- Biotech and Synthetic Biology
- Advanced Manufacturing
- Structural Materials under Extreme Conditions
- Materials for Clean Sustainable Energy

To review existing MRSECs, see:

mrsec.org





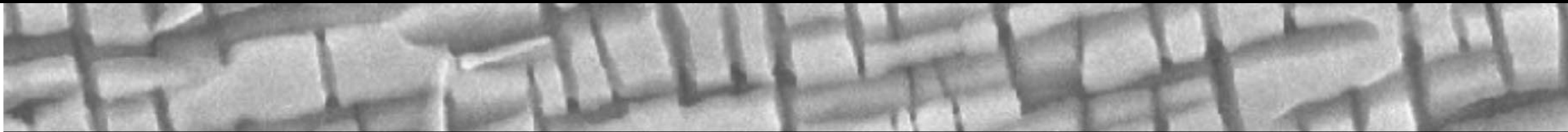
Synopsis of Program:

The Materials Research Science and Engineering Centers (MRSECs) program provides sustained support of materials research and education of the highest quality while addressing fundamental problems in science and engineering. Each MRSEC addresses research of a scope and complexity requiring the scale, synergy, and multidisciplinary provided by a campus-based research center. The MRSECs support materials research infrastructure in the United States, promote active collaboration between universities and other sectors, including industry and international organizations, and contribute to the development of a national network of university-based centers in materials research, education, and facilities. A MRSEC may be located at a single institution, or may involve multiple institutions in partnership, and is composed of two to three Interdisciplinary Research Groups, IRGs, each addressing a fundamental materials science topic aligned with the Division of Materials Research, DMR.

“contribute to the development of a national network of university-based centers in materials research, education, and facilities.”



The Next Decade of the Materials Genome Initiative (MGI)



The development of a materials innovation infrastructure (MII) that will enable rapid and significant reductions in the development time for new materials with improved properties is a critical element of the Materials Genome Initiative (MGI).

12345678910

Summary: The 2021 MGI Strategic Plan

[Goal 1. Unify the Materials Innovation Infrastructure](#)

[Objective 1](#)

[Impact stories](#)

[Objective 2](#)

[Impact story](#)

[Objective 3](#)

[Impact stories](#)

[Goal 2. Harness the power of materials data](#)

[Objective 1](#)

[Impact stories](#)

[Goal 3. Educate, train, and connect the materials R&D workforce](#)

[Objective 1](#)

[Impact story](#)

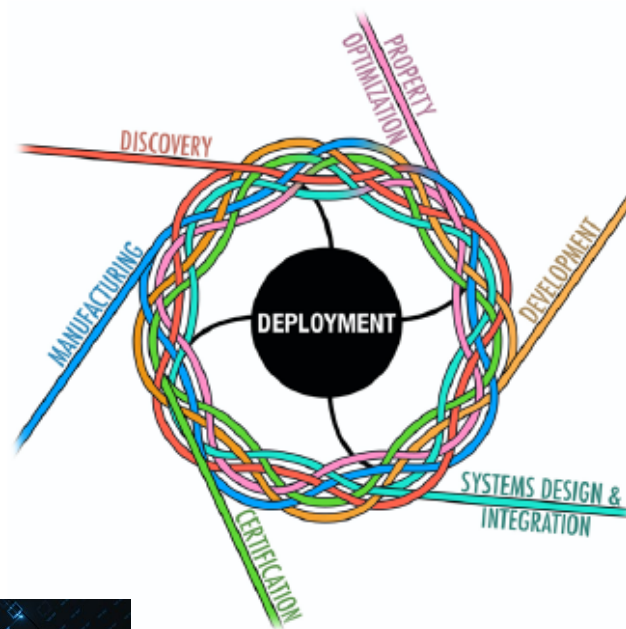
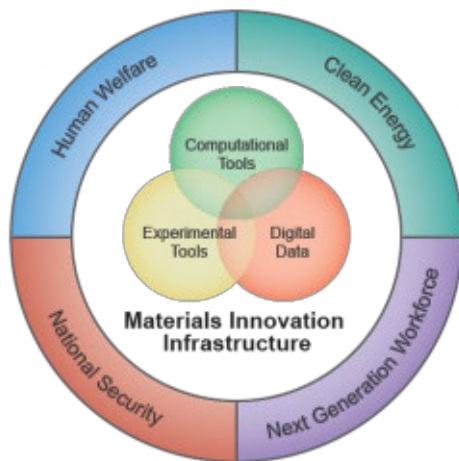
[Objective 2](#)

[Impact story](#)

[Objective 3](#)

Get the complete [2021 strategic plan](#).

[About the Materials Genome Initiative](#)



<https://www.marda-alliance.org/>





Division of Materials Research (DMR)

OFFICE OF THE DIVISION DIRECTOR

Linda Sapochak Division Director	Alex Antonios Deputy Division Director	Neila Odom-Jefferson Operations Specialist	Velma Lawson Program Support Manager

ADMINISTRATIVE UNIT

Meghan Ackerman Program Specialist	Benita Fair Program Analyst Outreach	Christopher Fintá Program Specialist	Allison Smith Program Specialist	Catherine Williams Program Analyst	Vacant Program Specialist	Claire Riley Student	Maria Magruder Contractor	Mitzi Bowen Contractor

PROGRAM DIRECTORS

National Facilities and Instrumentation

Leonard Spinu	Guebre X. Tessema	Charles Ying	Souleymane Omar Diallo	Cosima Boswell-Koller

Materials Research Science and Engineering Centers

Miriam Deutsch	Cosima Boswell-Koller

Partnerships for Research and Education in Materials

Debasis Majumdar	Shadi Mamaghani

Designing Materials to Revolutionize and Engineer our Future

John Schlueter	Mohsen Asle Zaeem	Eugenia Kharlampieva

Condensed Matter Physics

Tomasz Durakiewicz	Mun Chan	Vacant

Electronic and Photonic Materials

Yaroslav Koshka	Paul Lane

Condensed Matter and Materials Theory

Daryl W. Hess	Serdar Ogut	Sylvio May

Solid-State and Materials Chemistry

Birgit Schwenzer	Robert Meulenberg

Metals and Metallic Nanostructures

Jonathan Madison

Biomaterials

Nitsa Rosenzweig	Abraham Joy

Ceramics

Nazanin Bassiri-Gharb

Polymers

Andrew J. Lovinger

Cross-Cutting Activities

Krystle Wilson

Additional Scientific Staff

Germano Iannacchione

WELCOME, DMR new Division Director!!!

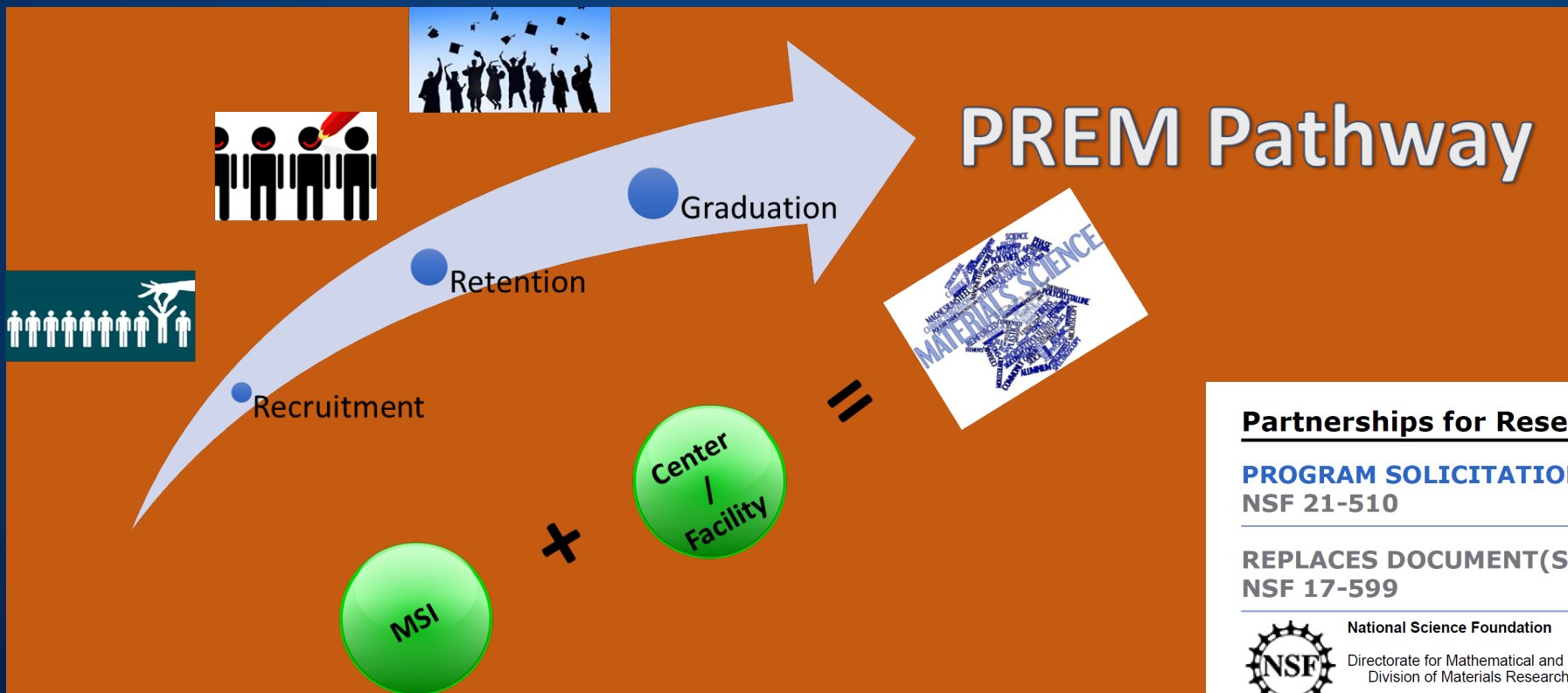
Effective: January 30, 2023



*Germano Iannacchione
Professor, Physics,
Worcester Polytechnic
University*



Partnership in Materials Research and Education (PREM) Program –



Debasis Majumdar
dmajumda@nsf.gov



Shadi Mamaghani
smamagha@nsf.gov

Partnerships for Research and Education in Materials (PREM)

PROGRAM SOLICITATION
 NSF 21-510

REPLACES DOCUMENT(S):
 NSF 17-599



National Science Foundation
 Directorate for Mathematical and Physical Sciences
 Division of Materials Research

Full Proposal Deadline(s) (due by 5 p.m. submitter's local time):
 February 05, 2021

Next competition
 starts Fall 2023!

Partners:
 MRSECs, MIPs
 Facilities
 STCs
 Quantum Foundries

Up to \$700K/yr over 6 yrs to MSI

**NSF 23-015 Dear Colleague Letter:
 NRT-PREM Collaborative Supplements**



Division of Materials Research: Topical Materials Research Programs (DMR:TMRP)

PROGRAM SOLICITATION NSF 22-609

REPLACES DOCUMENT(S): NSF 21-600



National Science Foundation

Directorate for Mathematical and Physical Sciences
Division of Materials Research

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

Proposals Accepted Anytime

Investigators are advised that the dates from April 15th to June 15th should, optimally, be avoided for submissions.

Biomaterials (BMAT)
Ceramics (CER)
Condensed Matter Physics (CMP)
Electronic & Photonic Materials (EPM)
Metals & Metallic Nanostructures (MMN)
Polymers (POL)
Solid State & Materials Chemistry (SSMC)

Condensed Matter & Materials Theory (CMMT)
NSF 22-610

IMPORTANT INFORMATION AND REVISION NOTES

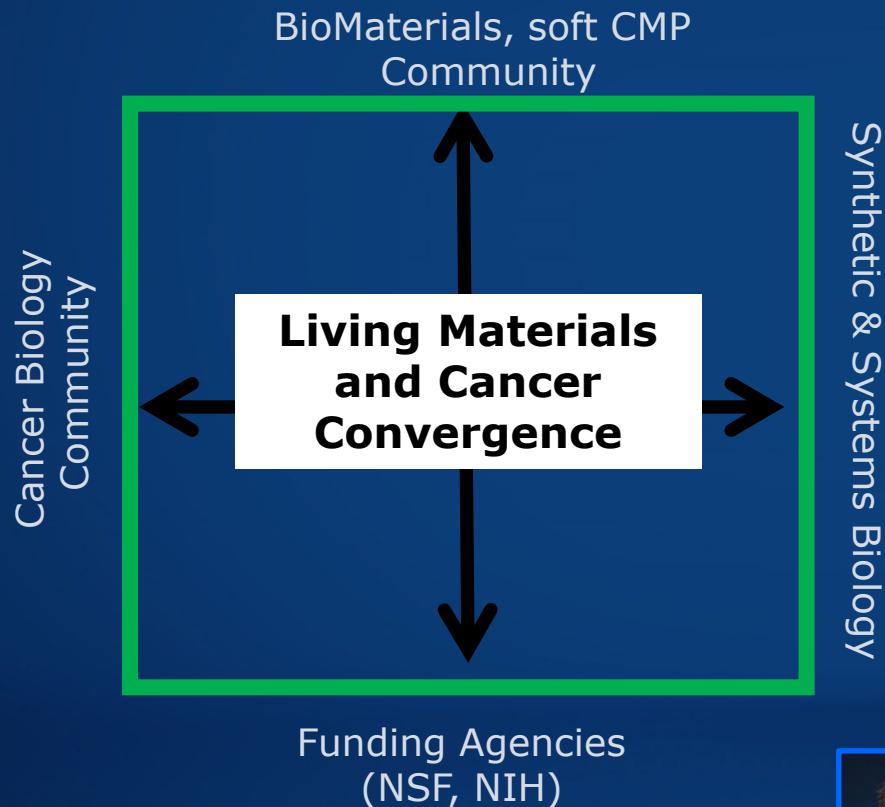
Revision Notes

- Additional requirements have been included for proposal preparation.
- Guidance on evaluating Data Management Plans is provided for PIs and reviewers.
- Limitations are specified on the number of proposal submissions per fiscal year. (The NSF fiscal year begins October 1st and ends September 30th of the following year.) Exemptions to these limitations include submissions to the Faculty Early Career Development Program (CAREER) program.

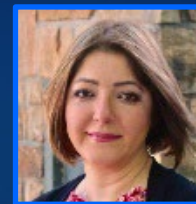
This solicitation applies to the following DMR Topical Materials Research Programs: Biomaterials (BMAT), Ceramics (CER), Condensed Matter Physics (CMP), Electronic and Photonic Materials (EPM), Metals and Metallic Nanostructures (MMN), Polymers (POL), and Solid State and Materials Chemistry (SSMC). The Condensed Matter and Materials Theory (CMMT) program has its own solicitation. Applicants to CMMT must apply through solicitation [NSF 22-610](#).



DMR and **Biotechnology** – Building New Collaborations with NIH



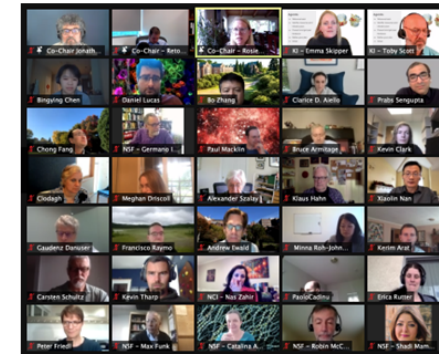
Germano Iannacchione



Shadi Mamaghani

NSF-NCI Square-Table (SQT) Summary

Recognizing recent advances in new tools/techniques, computational capabilities, and our understanding of biology, the National Cancer Institute (NCI) Division of Cancer Biology (DCB) and the National Science Foundation (NSF) Mathematical and Physical Sciences (MPS) Directorate partnered to explore the frontier of the intersection of fundamental mathematics and science with cancer research through a series of special meetings. The Square-Table (SQT) format for the meeting was employed to provide structure to bring together researchers that do not normally intersect in a substantial way to explore the intellectual landscape 10-15 years out. The SQT approach defines four groups of researchers from the 1) Mathematical and Physical Sciences, 2) Synthetic and Systems Biology, 3) Cancer Biology, and 4) NSF MPS and NCI DCB program directors for the starting point of broad and exploratory conversations.



Screenshot of SQT-Windows on the Cell meeting, April 2021

The format emphasizes mixing of groups into breakout sessions for discussions, guided by context setting background material and guiding questions organized by each SQT meeting co-chairs and a synthesis/analysis intellectual roadmap summary prepared by the co-chairs. These outcomes will provide the material needed for further discussions between NSF and NCI program directors to inform each agency on areas of mutual interest for a potential joint effort to enable novel interdisciplinary research as well as inform more broadly the multiple communities on important scientific questions.

The joint NSF-NCI organizing team defined the areas for three SQT meetings, selected the 3-4 co-chairs representing the different sides/disciplines of the table, provided guidance on the selections of 35-40 participants to ensure balanced representation of disciplines, organized the participation of fed agency representatives, and ensured feedback/adjustments as needed throughout the meetings.

Table of Contents

[SQT - Living Materials](#)

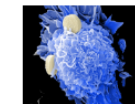
[SQT - Windows on the Cell](#)

[SQT - Emergent Properties](#)

[Contacts Involved in the Square Tables efforts with NCI](#)

This page is a companion website to a similar one at NCI (<https://www.cancer.gov/about-nci/organization/dcb/news/square-tables>)

SQT - Living Materials



(Co-Chairs: [Shannon Mumenthaler](#) (USC) – Cancer Biology; [Shelly Peyton](#) (UMass) – Biomaterials; [Krishnendu \(Krish\) Roy](#) (Georgia Tech) – Synthetic and Systems Biology) 23, 30, 31 March 2021 and 06 April 2021.

Report on Living Materials SQT: PDF, 2,607 KB



<https://www.acpt.nsf.gov/mps/cancer-collab.jsp>

NSF 23-039

Dear Colleague Letter: MPS-NCI Supporting new Areas of Knowledge (SPARK): Cancer as a Living Material – New Ideas and New Connections

A webinar will be presented on **January 19th, 2023**, that will provide details on this collaborative effort featuring National Science Foundation Program Officers from the Directorate of Mathematical and Physical Sciences (MPS) as well as Program Officers from the Division of Cancer Biology (DCB) and the Center for Cancer Training (CCT) of the National Cancer Institute (NCI).



DMR and Data Management Plans

– FAIR Principles Expected

Dear Colleague Letter: Effective Practices for Making Research Data Discoverable and Citable (Data Sharing) (NSF 22-055)



<https://www.nsf.gov/bfa/dias/policy/dmpdocs/dmr.pdf>



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Critical Aspects of Sustainability (CAS)

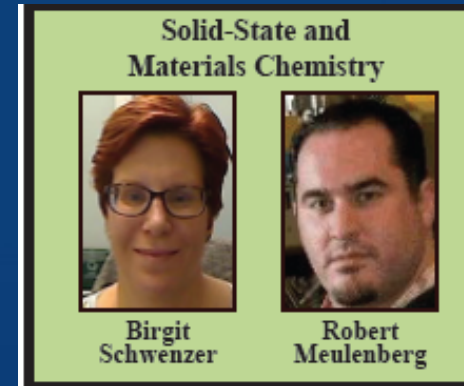
NSF “meta program” – existing core programs across NSF form a “virtual” program around an important topic area.



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**Dear Colleague Letter
Critical Aspects of Sustainability (CAS):
Innovative Solutions to Sustainable
Chemistry (CAS-SC)**

**NSF 21-124_ Dear Colleague Letter:
Critical Aspects of Sustainability (CAS):
Innovative Solutions to Climate Change**



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<https://beta.nsf.gov/funding/opportunities/critical-aspects-sustainability-cas>

Computer and Data Enabled Science and Engineering (CDS&E)

NSF “meta program” – existing core programs across NSF form a “virtual” program around an important topic area.

Supports research that uses new computational and data science approaches to advance knowledge and accelerate discovery in science and engineering.



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<https://beta.nsf.gov/funding/opportunities/computational-data-enabled-science-engineering-2>



DMR Investments in the Materials Cyberinfrastructure

Cyberinfrastructure for Sustained Scientific Innovation (CSSI)

PROGRAM SOLICITATION

NSF 22-632

REPLACES DOCUMENT(S):

NSF 21-617



National Science Foundation

Directorate for Computer and Information Science and Engineering
Office of Advanced Cyberinfrastructure
Division of Computing and Communication Foundations
Division of Information and Intelligent Systems

Directorate for Biological Sciences

Directorate for STEM Education

Directorate for Engineering
Division of Electrical, Communications and Cyber Systems
Division of Chemical, Bioengineering, Environmental and Transport Systems
Division of Civil, Mechanical and Manufacturing Innovation

Directorate for Geosciences
Division of Atmospheric and Geospace Sciences
Division of Earth Sciences
Division of Ocean Sciences
Office of Polar Programs

Directorate for Mathematical and Physical Sciences
Division of Physics
Division of Astronomical Sciences
Division of Mathematical Sciences
Division of Materials Research
Division of Chemistry

Directorate for Social, Behavioral and Economic Sciences



Daryl Hess

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

December 16, 2022

December 01, 2023

December 1, Annually Thereafter

- **Elements:** Targets small groups that will create and deploy robust services for which there is a demonstrated need, and that will advance one or more significant areas of science and engineering.
- **Framework Implementations:** Targets larger, interdisciplinary teams organized around the development and application of services aimed at solving common research problems faced by NSF researchers in one or more areas of science and engineering and resulting in a sustainable community framework providing CI services to a diverse community or communities.
- **Transition to Sustainability:** Targets groups who would like to execute a well-defined sustainability plan for existing CI with demonstrated impact in one or more areas of science and engineering supported by NSF. The sustainability plan should enable new avenues of support for the long-term sustained impact of the CI.



Designing Materials to Revolutionize and Engineer our Future (DMREF)

PROGRAM SOLICITATION
NSF 23-530

REPLACES DOCUMENT(S):
NSF 21-522



National Science Foundation

Directorate for Mathematical and Physical Sciences
Division of Materials Research
Division of Chemistry
Division of Mathematical Sciences

Directorate for Engineering
Division of Civil, Mechanical and Manufacturing Innovation
Division of Electrical, Communications and Cyber Systems
Division of Chemical, Bioengineering, Environmental and Transport Systems

Directorate for Computer and Information Science and Engineering
Office of Advanced Cyberinfrastructure
Division of Computer and Network Systems
Division of Information and Intelligent Systems

Directorate for Technology, Innovation and Partnerships
Innovation and Technology Ecosystems



Air Force Research Laboratory



Air Force Office of Scientific Research



National Institute of Standards and Technology



Department of Energy (DOE) Office of Energy Efficiency & Renewable Energy



Office of Naval Research



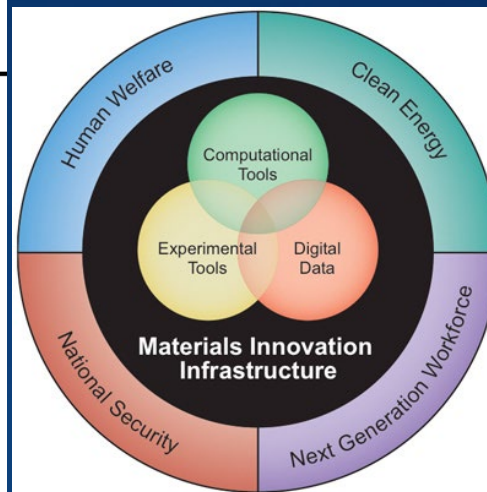
U.S. Army Combat Capabilities Development Command – Army Research Laboratory



U.S. Army Combat Capabilities Development Command – Ground Vehicle Systems Center

Submission Window Date(s) (due by 5 p.m. submitter's local time):

February 27, 2023 - March 13, 2023



Biennial program
Next competition: 2023



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Mohsen Asla Zaeem mzaeem@nsf.gov



NSF National Science Foundation

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Future Manufacturing (FM)

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22-568

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Important Information for Proposers
A revised version of the *NSF Proposal & Award Policies & Procedures Guide (PAPPG)* (NSF 22-1), is

Synopsis

The global manufacturing ecosystem has evolved dramatically in recent decades, driven by forces of technology and globalization and steered by the pursuit of greater efficiencies at scale. The Strategy for American Leadership in Advanced Manufacturing states that worldwide competition in manufacturing has been dominated in recent decades by the maturation, commoditization, and widespread application of computation in production equipment and logistics, effectively leveling the global technological playing field and placing a premium on low wages and incremental technical improvements.^[1] The next generation of technological competition in manufacturing will be dictated by a combination of the use of computation to ensure the reliable translation of product designs to manufacturing plans; process controls that provide assurances that the execution of those plans will produce products that meet specifications; inventions of new materials, chemicals, devices, systems, processes, machines, and design and work methods; and new social structures and business

[Expand +](#)

Updates and announcements

Future Manufacturing resources available
March 8, 2022

[View more updates](#)

Program guidelines

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

Estimated number of awards
22 - In FY 2022, depending on the quality of submissions and the availability of funds: -- approximately 8 FMRG will be awarded as Standard Grants or Continuing Grants for a period up to four years; and -- approximately 14 FMSG will be awarded as Standard Grants or Continuing Grants for a period up to two years. **Proposals Involving Multiple Organizations.** The Proposal & Award Policies & Procedures Guide (PAPPG) describes two kinds of collaborative proposal formats. This solicitation allows only a single proposal submission with subawards administered by the lead organization (Chapter II.D.3.a). For proposals involving multiple organizations, a lead organization must

<https://beta.nsf.gov/funding/opportunities/future-manufacturing-fm>

NSF National Science Foundation

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Future of Semiconductors- Teaming for Co-Design Research Capacity (FuSe)

[View guidelines](#)
22-589

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Important Information for Proposers
A revised version of the *NSF Proposal & Award Policies & Procedures Guide (PAPPG)* (NSF 22-1), is

Synopsis

The current state of semiconductor microelectronic systems is at a crossroads. Continued advances in the range and capabilities of our technologies as well as reducing their cost of applications across computing, sensing, and communications represent a tremendous opportunity. The technology has expanded following the trends in miniaturization long characterized by Moore's Law, underpinned by new materials, processes, devices, and architectures. The developments in these underpinning areas have often progressed independent of the application area, delaying their incorporation into the next-generation technologies. Closing that gap between the essential components in the technology stack, from materials through devices to systems, is now required to ensure further progress. The materials, devices and systems need to be *co-designed*, that is, designed with simultaneous consideration of as many elements of the technology chain as possible, spanning materials, devices, circuits, architectures, software, and applications.

[Expand +](#)

Updates and announcements

FuSe webinar recording and slides available
June 27, 2022

[View more updates](#)

Program guidelines

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

Estimated number of awards
30 - In FY 2022, depending on the quality of submissions and the availability of funds: -- *FuSe* Teaming Grants will be awarded as Standard awards or Continuing grants for periods of up to two years and at up to \$100,000 per participating organization, with a minimum of at least three participating organizations per project. The inclusion of minority-serving institutions and those organizations which contribute to research and training by focusing on the skilled technical workforce is encouraged. **Proposals Involving Multiple Organizations.** The NSF PAPPG describes two kinds of collaborative proposal formats. This solicitation allows only a **single proposal** submission with

<https://beta.nsf.gov/funding/opportunities/future-semiconductors-teaming-co-design-research>

DMR Major Facilities & Sub-facilities

National High Magnetic Field Laboratory (NHMFL) <https://nationalmaglab.org/>

Center for High Energy X-ray Science (CHEXS) <https://www.chess.cornell.edu/partners/chexs>

Center for High Resolution Neutron Scattering (CHRNS) <https://www.nist.gov/ncnr/chrns>

National Nanotechnology Coordinated Infrastructure (NNCI) <https://nnci.net/>

ChemMatCARS /University of Chicago <https://chemmatcars.uchicago.edu/>

Materials Research Facilities Network <https://mrsec.org/facilities>

BioPolymers, Automated Cellular Infrastructure, Flow, and Integrated Chemistry Materials Innovation Platform (BioPACIFIC MIP) <https://biopacificmip.org/>

GlycoMIP <https://glycomip.org/>

2D Crystal Consortium MIP (2DCC) <https://www.mri.psu.edu/2d-crystal-consortium>

Platform for the Accelerated Realization, Analysis, and Discovery of Interface Materials (PARADIM) <https://www.paradim.org/>





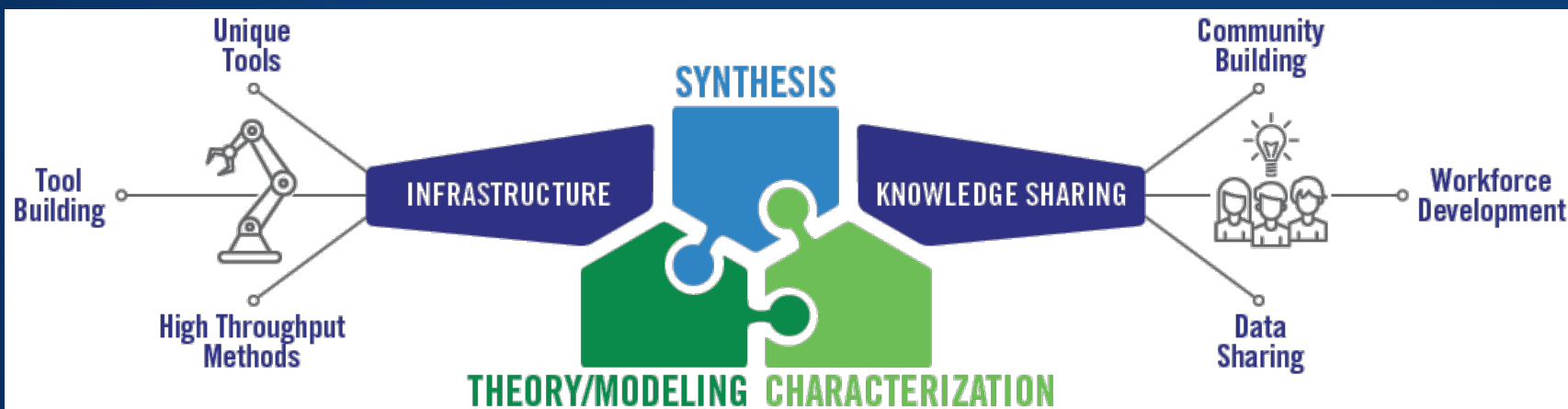
MATERIALS INNOVATION PLATFORMS



Cosima Boswell-Koller



Charles Ying

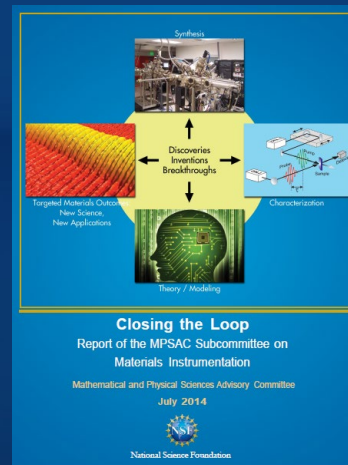
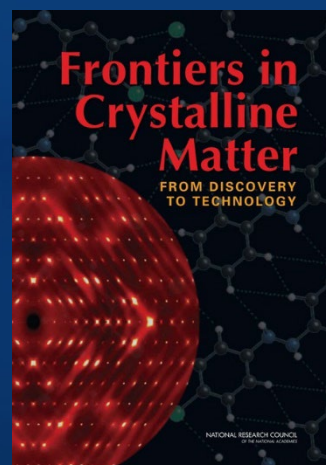
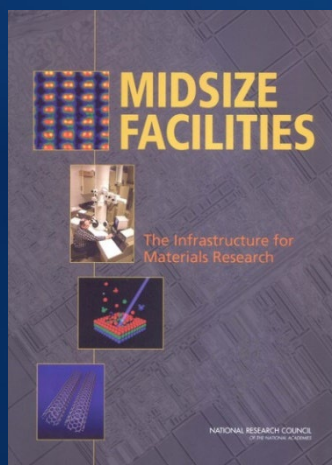


A relatively new mid-scale infrastructure program in DMR: two competitions in 2015 and 2019

Build and nurture a scientific ecosystem, sharing knowledge (instruments, codes, samples, data, metadata, know-how, ...)

Use the Materials Genome Initiative (MGI) approach

Designed to accelerate advances in materials research topics of national importance

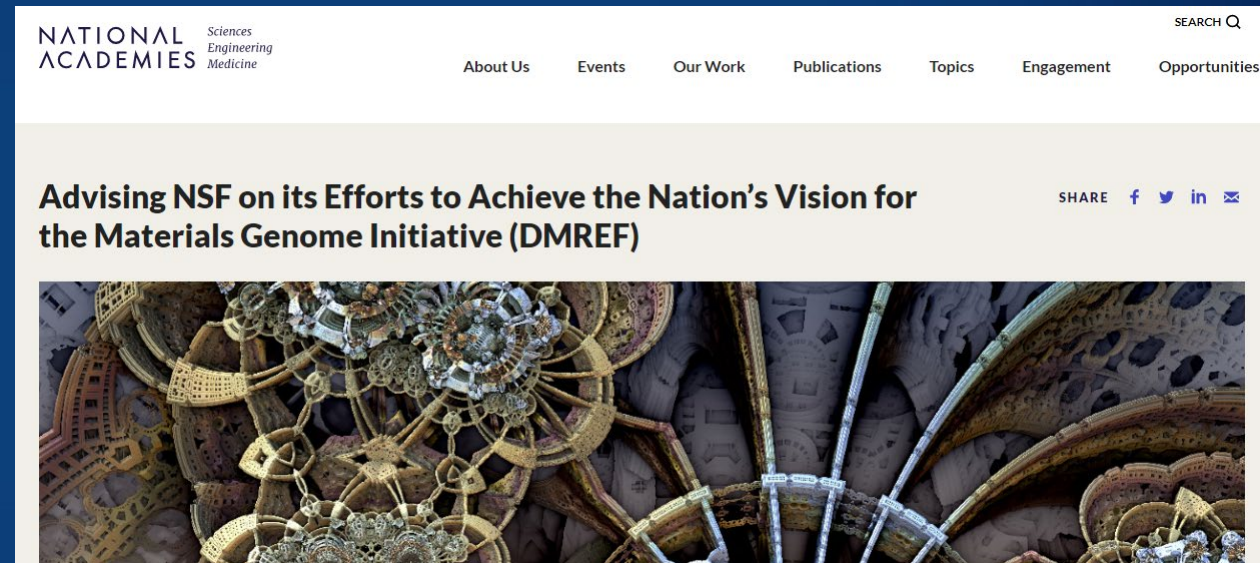
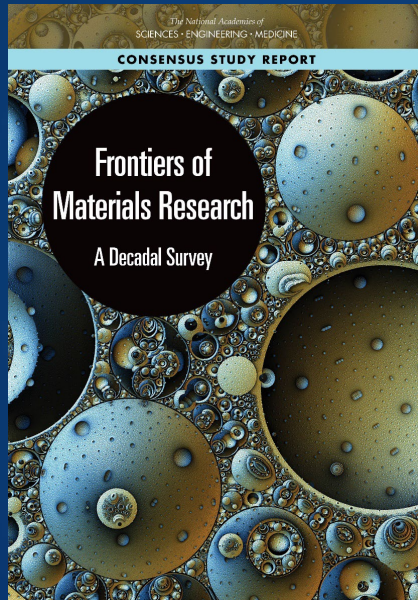


3 Workshops - “Materials Laboratories of the Future”

- **Group A: Soft Materials, Polymers, and Biomaterials** (e.g., proteins, biomembranes, polymers, liquid crystals, complex fluids, colloids, organic semiconductors, molecular crystals)
 - Co-Chairs: Nicholas Abbott (*Cornell U*), Chinedum Osuji (*UPenn*), & Margaret Gardel (*UChicago*)
 - October 17-18th, 2022, Hybrid: Chicago <https://jfi.uchicago.edu/soft-materials-polymers-and-biomaterials-workshop/>.
- **Group B: Alloys, Amorphous and Composite Materials** (e.g., high-entropy materials, glasses, metallic glasses, nanocomposites, polycrystalline materials, metal-organic frameworks)
 - Co-Chairs: Andrew Minor (*UC Berkeley*), Sarbajit Banerjee (*Texas A&M*), & Ying Shirley Meng (*ANL*)
 - November 3-4th, 2022, Hybrid: Chicago
- **Group C: Materials with Long-Range Order** (e.g., bulk crystals, epitaxial films, 2-dimensional materials, Van der Waals materials)
 - Co-Chairs: Simon Billinge (*Columbia U*), Susanne Stemmer (*UCSB*), & Pablo Jarillo-Herrero (*MIT*)
 - November 5-6th, 2022, virtual.



MGI and the Nano Initiative had the greatest impact on materials research in the last decade....NASEM: Frontiers of Materials Research: A Decadal Survey



What can the MRSECs do collectively that will have the greatest impact in materials research over the next decade?

