

DIVISION of MATERIALS RESEARCH

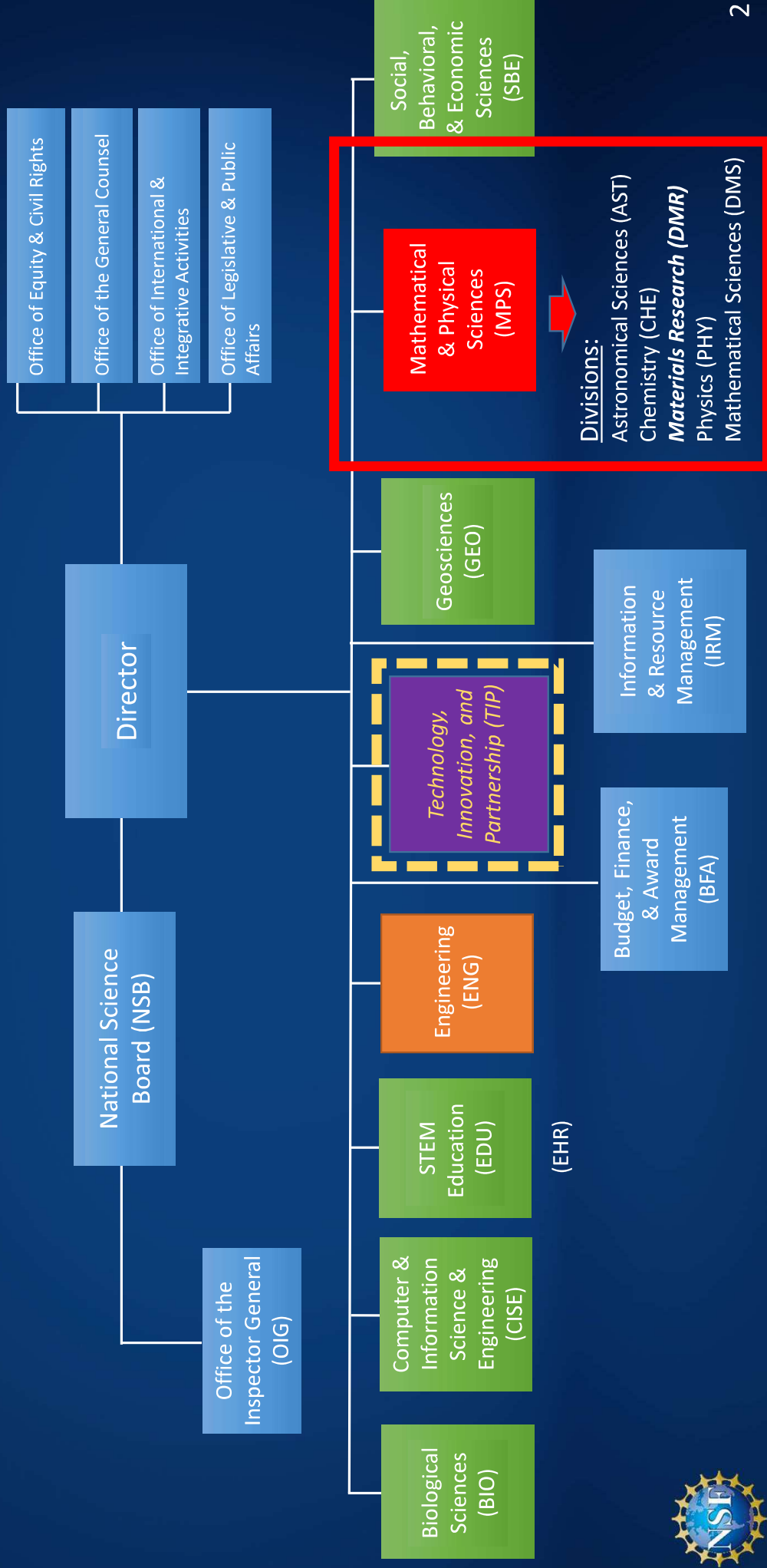
CMMRC 2024 Update



Germano Iannacchione,
Division Director, DMR
Mathematical & Physical Sciences



National Science Foundation Organization





MATHEMATICAL & PHYSICAL SCIENCES SENIOR STAFF



Assistant Director
David Berkowitz

FY23 \$1,686 M
NSF's Largest Research Dir.



Staff Associate
Catalina Achim



Office of Strategic Initiatives (OSI)
Dean Evasius
OSI
\$170 M



Deputy Assistant Director
Tie Lou



Senior Strategy Advisor (Acting)
Bevin Ashley Vanderley



Facilities Science Analyst
Nelyan Lopez Perez
Staff Associate for Facilities
Tim Steven Spuck



Interim Division Director Astronomical Sciences
Chris Smith



Acting Division Director Chemistry
Lin He



Deputy Division Director Astronomical Sciences
James Neff



Acting Deputy Division Director Chemistry
George Richter-Addo



Division Director Materials Research
Iannacchione



Deputy Division Director Materials Research
Miriam Deutsch



Division Director Mathematical Sciences
David Manderscheid



Deputy Division Director Mathematical Sciences
Junping Wang



Division Director Physics
Saul Gonzalez



Acting Deputy Division Director Physics
Michael Cavagnero



AST
\$284 M

CHE
\$265 M

DMR
\$339 M

DMS
\$248 M

PHY
\$310 M

DMR: Mission & Vision

- Materials Research is defined by the broad intersection of many disciplines with materials science & engineering (MS&E), including **physics, chemistry, biology, mathematics**, and other **engineering** disciplines that naturally converge in the pursuit of understanding the properties of materials and the phenomena they host.
- Materials are abundant and pervasive, serving as critical building blocks in technology and innovation. **The development and deployment of advanced materials are major drivers of U.S. economic growth.**
- DMR invests in the **discovery, prediction**, and **design of new** materials and the explanation of materials phenomena, as well as in the development of the next generation of materials scientists, which includes increasing the pathways for participation by underrepresented minorities.
- DMR supports fundamental **experimental** and **theoretical** materials research. This enterprise is dependent on **investments across scales**, including single investigators, teams, and centers; singularly focused research and areas requiring interdisciplinarity; and infrastructure ranging from small instruments to large-scale facilities.





U.S. National Science Foundation
WHERE DISCOVERIES BEGIN

MPS Division of Materials Research

OFFICE OF THE DIVISION DIRECTOR



Germano Iannacchione
Division Director



Miriam Deutsch
Acting Deputy Division Director



Velma Lawson
Program Support Manager



Alex Kironomos
Senior Advisor



Nella Odom-Jefferson
Operations Specialist

ADMINISTRATIVE UNIT



Jamison Schneider
Program Analyst Outreach



Denise Williams
Program Analyst (Detail)



Allison Smith
Program Specialist



Meghan Ackerman
Program Specialist



Chris Finta
Program Specialist



Tiae Covington
Program Specialist



Claire Riley
Student



Maria Magruder
Contractor



Mitzi Bowen
Contractor

PROGRAM DIRECTORS

National Facilities and Instrumentation



Leonard Spino



Guebre X. Tessema



Charles Ying

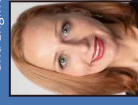


Souleymane Omar Diallo



Cosima Boswell-Koller

Materials Research Science and Engineering Centers



Cosima Boswell-Koller

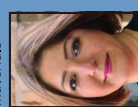


Serdar Ogut

Partnerships for Research and Education in Materials



Debasis Majumdar



Shadi Mamaghani

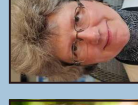
Designing Materials to Revolutionize and Engineer our Future



John Schlueter



Mohsen Asle Zaeem



Eugenia Kharlampleva

Biomaterials



Nilsa Rosenzweig



Dan Savin

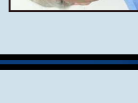
Condensed Matter Physics



Elizabeth Mann



Tomasz Durakiewicz

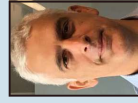


Mun Chan

Condensed Matter and Materials Theory



Daryl W. Hess



Alex Kironomos



Robert Hoy

Electronic and Photonic Materials



Paul Lane



Yaroslav Koshka

Ceramics



Nazanin Bassiri-Gharb

Metals and Metallic Nanostructures



Jonathan Madison

Polymers



Andrew J. Lovinger



Christopher Ober

Solid State and Materials Chemistry



Birgit Schwenzler



Robert Meulenberg

Cross-Cutting Activities



Krystle Wilson

Experts



Catherine Oertel



Hanno zur Loye

DMR TEAM:

Leadership (5)

Admin Unit (9)

Program Directors (28)

Permanent (18)

IPA (9)

VSEE (1)

Expert (2)

Total = 43

DMR: Organization

- **Topical Materials Research Programs (TMRP) – NSF 23-612**
 - Disciplinary
 - Condensed Matter Physics (CMP - 171000)
 - Condensed Matter & Materials Theory (CMMT - 176500) – AI/ML – NSF 23-611
 - Solid State and Materials Chemistry (SSMC - 176200)
 - Focused
 - Biomaterials (BMAT - 762300)
 - Polymers (POL - 177300)
 - Electronic & Photonic Materials (EPM - 177500)
 - > Bioeconomy, Health, Sustainability,
 - > Sustainability, Climate, Emerging Industries
 - > Beyond Si, photonics, towards devices
 - > Future of Manufacturing, extreme environ
 - Ceramics (CER - 177400)
 - Metals & Metallic Nanostructures (MMN - 177100)> Energy, Sustainability, up/re/de-cycling



DMR: Organization

- **Centers & Teams**

- Materials Research Science and Engineering Centers (**MRSEC - 173500**) – triannual
- Partnerships for Research & Education in Materials (**PREM - 791300**) – triannual
- Designing Materials to Revolutionize & Engineer our Future (**DMREF - 829200**) – biannual
- Quantum Foundries (Q-AMASE-I)
 - UCSB Quantum Foundry
 - MonArk Quantum Foundry
- Science & Technology Centers (**STC**), each are **\$30M over 5-years**
 - **STROBE** (Advanced Microscopy, U. Colorado, Boulder) – 2021
 - **IMOD** (Optoelectronic Materials, U. Washington) – 2021
 - **COMPASS** (Complex Particle Systems, U. Michigan) – 2023
 - **NewFoS** (Topological Acoustics, U. Arizona) – 2023



DMR: Organization

- **National Facilities & Instrumentation (NaFI)**
 - Major Research Instrumentation Program (**MRI - 118900**) – NSF wide
 - Materials Innovation Platforms (**MIP – 003Y00**) – **DMR MGI Mid-Scale**
 - Mid-Scale Research Instrumentation (**MSRI-1 & 2**) – NSF wide
- **National Facilities:**
 - Center for High-Resolution Neutron Scattering (**CHRNS**)
 - Center for High-Energy X-ray Sciences (**CHEXS**) @ Cornell High-Energy Synchrotron Sources (**CHESS**)
 - National High-Magnetic Field Laboratory (**NHMFL**)
 - Partners with:
 - Chemistry and Material Sciences Center for Advanced Radiation Sources (**ChemMatCARS**)
 - National Nanotechnology Coordinated Infrastructure (**NNCI**)



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/>

Advanced Photon Source: ChemMatCARS / U. Chicago <https://chemmatcars.uchicago.edu/>

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

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



DMR: Organization

- **Cross-Cutting Activities in Materials Research (XC) & REU**
- **DMR Cross-Cutting NSF-Wide Activities:**
 - Critical Aspects of Sustainability (CAS) – meta
 - Computational and Data-Enabled Science and Engineering (CDS&E) – meta
 - Cyberinfrastructure for Sustained Scientific Innovation (CSSI)
 - Harnessing the Data Revolution (HDR) – **NSF 10 Big Ideas (retired)**
 - Quantum Leap – **NSF 10 Big Ideas (now QISE)**
 - MPS Launching Early-Career Academic Pathways (MPS-LEAPS)
 - MPS Ascending Postdoctoral Research Fellowships (MPS-Ascend)
 - **Future of Semiconductors (FuSe) – FuSe2 award just announced**
 - NSF-NIST Interaction in Basic and Applied Scientific Research
 - NSF-FDA Scholar-in-Residence at the FDA (FDA/SiR)
 - Semiconductor Synthetic Biology (SemiSynBio-X)
 - Strengthening the Cyberinfrastructure Professionals Ecosystem (SCiPE)
 - **Future Manufacturing (FM)**



DMR: Portfolio FY2019-2022

All Grants

1,897

Funded Orgs.

289

Funding (USD)

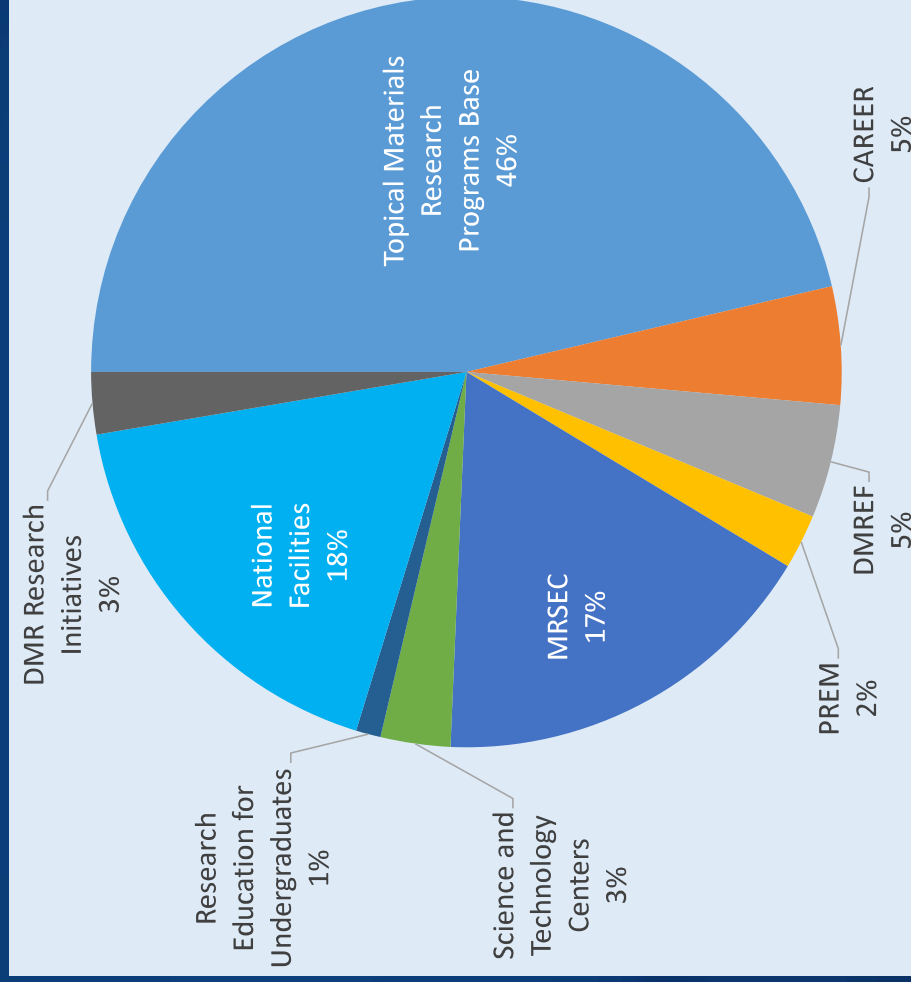
FY2019: \$303.0 M

FY2020: \$330.2 M

FY2021: \$330.1 M

FY2022: \$338.8 M

\$1.302 B



Finding Funding Opportunities Across NSF:



U.S. National
Science
Foundation

Find Funding & Apply ▾Manage Your Award ▾Focus Areas ▾News & Events ▾About ▾

Search NSF

[Home](#) / [Funding at NSF](#) / [Funding Search](#)

Get NSF funding information by [Email](#) or by [RSS](#).

Funding Search

You can find active funding opportunities on this page. Or, access archived opportunities or search funded awards.

Search

All fields ▾

Search

?

45 results

You can find active funding opportunities on this page. Or, access archived opportunities or search funded awards.

Filter by

Directorate/Division: Materials Research (MPS/DMR) 

Reset all filters

Award type ▾

Limited submissions ▾

Directorate/Division ▾

Education level ▾

☐ Exclude Dear Colleague Letters

☐ Show only NSF-wide and cross-directorate opportunities

☐ Show only programs included in the NSF Broadening Participation Portfolio

Sort by ▾

New opportunities ▾

45 results [Export results as .csv](#)

Searching NSF Awards:

<https://www.nsf.gov/awardsearch/advancedSearch.jsp>

Specific PI/Org

Select NSF Org, e.g., "DMR"

PEC for programs

Keywords

Active or Expired

The screenshot shows the NSF Awards Advanced Search interface. At the top, there is a navigation bar with links like 'Simple Search', 'Advanced Search', 'Popular Searches', 'Download Awards', 'Send Comments', 'Award Search Help', 'Find Funding & Apply', 'Manage Your Award', 'Focus Areas', 'News & Events', and 'About'. A search bar at the top right contains the text 'Search NSF'.

The main search area is divided into three sections:

- Recipient Information:** Includes fields for 'Principal Investigator First Name', 'Principal Investigator Last Name', 'Include Co-Principal Investigator in name search' (checkbox), 'Organization', 'State', 'Zip Code', and 'Country'. Arrows point from the text 'Specific PI/Org' to the PI name fields and from 'Select NSF Org, e.g., "DMR"' to the Organization dropdown.
- Program Information:** Includes a 'HINT' box, 'NSF Organization' dropdown, 'Element Code', 'Reference Code', 'Program' dropdown, and 'Program Officer' field. Arrows point from 'PEC for programs' to the Program dropdown and from 'Keywords' to the Keyword field.
- Additional Information:** Includes a 'HINT' box, 'Keyword' field, 'Award Number', 'Award Amount', 'Award Instrument', 'Original Award Date' (dropdown), 'Start Date' (dropdown), 'End Date' (dropdown), 'Active Awards' (checkbox), and 'Expired Awards' (checkbox). Arrows point from 'Keywords' to the Keyword field and from 'Active or Expired' to the Active/Expired checkboxes.

At the bottom right, there is a 'Search' button (circled in blue) and a 'Reset' button.



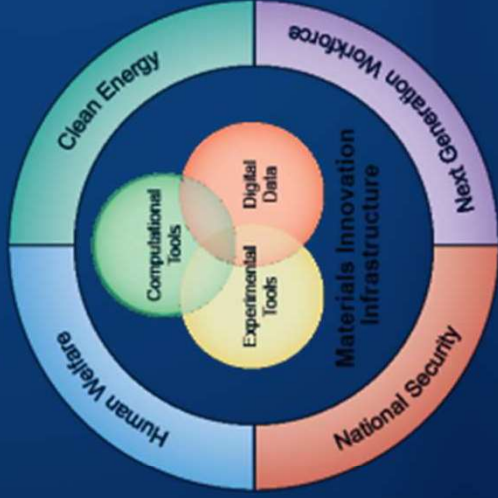
Materials Genome Initiative (MGI)

<https://www.mgi.gov/>

The MGI is a federal multi-agency initiative for discovering, manufacturing, and deploying advanced materials twice as fast and at a fraction of the cost compared to traditional methods. The initiative creates policy, resources, and infrastructure to support U.S. institutions in the adoption of methods for accelerating materials development.

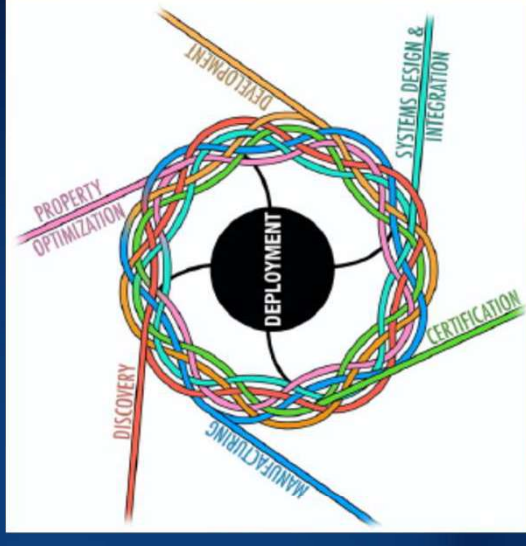
2021 MGI STRATEGIC PLAN: 3 GOALS

1. Unify the Materials Innovation Infrastructure (MII), a framework of integrated advanced modeling, computational and experimental tools, and quantitative data
2. Harness the power of **materials data**
3. Educate, train, and connect the materials research and development workforce



NSF/DMR : DMREF

<https://dmref.org/>



Designing Materials to Revolutionize and Engineer our Future (DMREF)

PROGRAM SOLICITATION
NSF 23-530

REPLACES DOCUMENT(S):
NSF 21-522

<https://dmref.org/>



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:
[Recent: 2023](#)
[Next: 2025](#)

<https://new.nsf.gov/news/nsf-invests-72m-design-revolutionary-materials>



John Schlueter, jschluet@nsf.gov



Eugenia Kharlampieva, ekharlam@nsf.gov



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



<https://mrsec.org>

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

Triennial Program:

[Recent: 2022/23](#)

[Next: 2025/26](#)

<https://new.nsf.gov/news/nsf-invests-162-million-research-centers>



cboswell@nsf.gov

sogut@nsf.gov

Recent Focuses:

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

Materials Research Facilities Network

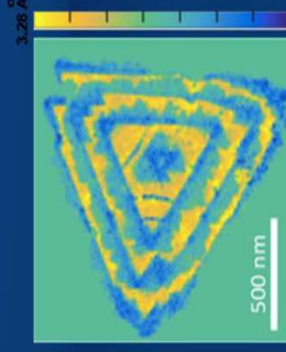


The Materials Research Facilities Network (MRFN) is a nationwide partnership of the Shared Experimental Facilities supported by the NSF/DMR **MRSECs**. The MRFN is designed and operated to provide support to researchers and experimental facilities engaged in Materials Research in academic, government, and industrial labs around the world.



Workshop Report: *Shared instrumentation facilities: Benefiting researchers and universities, and sustaining research excellence*
<https://doi.org/10.1557/mrs.2020.130>

<https://mrfn.org/>

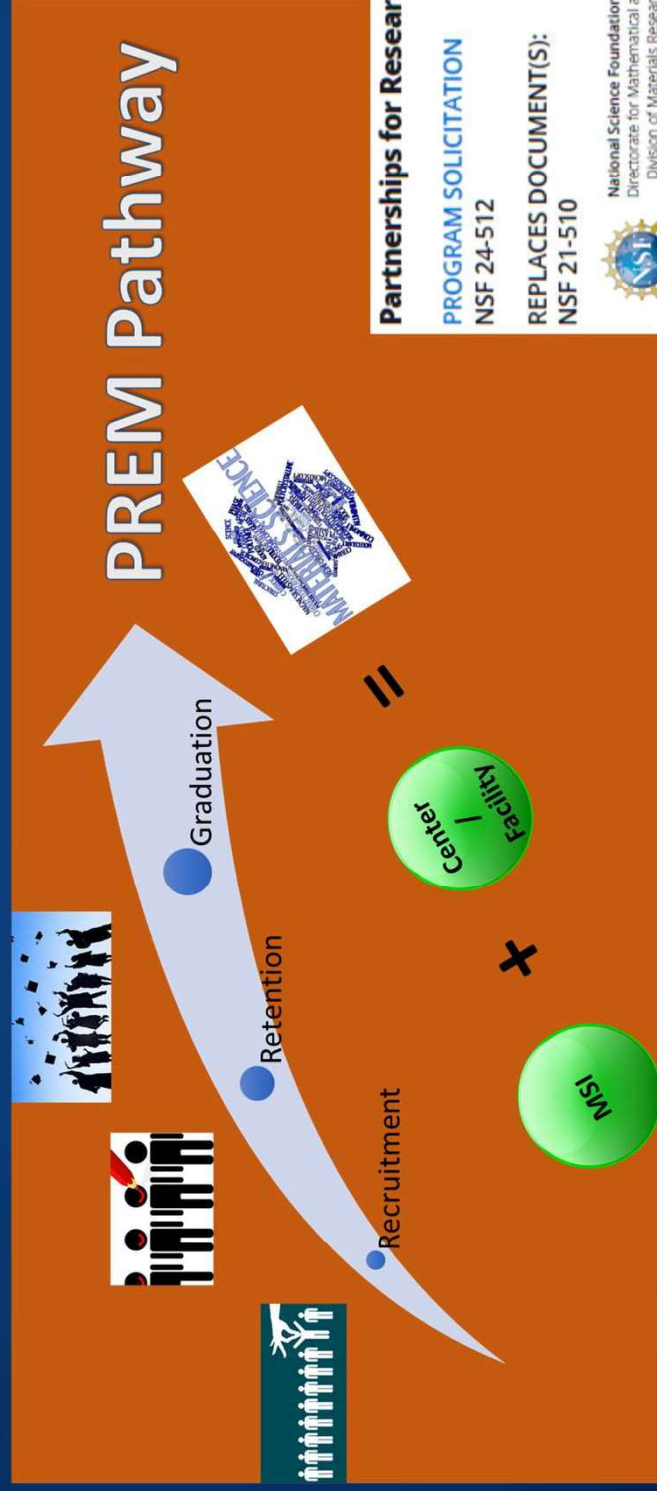


FY22 Users of MRSEC Facilities

- > 1600 Academic
- > 300 Industry
- > 10 National Labs



Partnership in Research and Education in Materials (PREM) Program –



Debasis Majumdar Shadi Mamaghani
dmajumda@nsf.gov smamagha@nsf.gov

Partnerships for Research and Education in Materials (PREM)

PROGRAM SOLICITATION

NSF 24-512

REPLACES DOCUMENT(S):

NSF 21-510



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

Full Proposal Target Date(s):

March 12, 2024

Completed

Competition 2024

Next 2027



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

<https://new.nsf.gov/news/nsf-funds-over-50m-new-partnerships-broaden>

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



Charles Ying

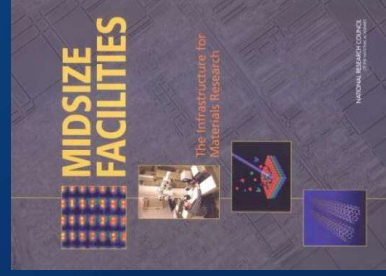
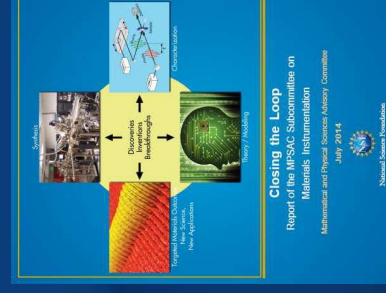


A relatively new mid-scale infrastructure program in DMR: two competitions in 2015 and 2019

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



Automatic and Autonomous Capabilities of MIPs



- Automated, high-throughput Living Bioreactor Platform at BioPACIFIC MIP



- (1) Automated glycan synthesizers for *de novo* glycan synthesis and (2) autonomous computational methods for predicting and assigning the spectra of glycopolymers at GlycoMIP



- Improving bulk crystal growth by deep learning at PARADIM, in collaboration with Army Research Laboratory

- Lifetime Sample Tracking (LiST), with capabilities for automatic storing/upload of growth recipes and materials characterization data for each sample, at 2DCC MIP

- LiST 2.0 includes a knowledge graph with an ontology describing the relationships between samples, tools, characterization data, simulations, etc., in context-aware, graph structured data with machine learning pipelines

More information available at [MIP.org](https://mip.org)

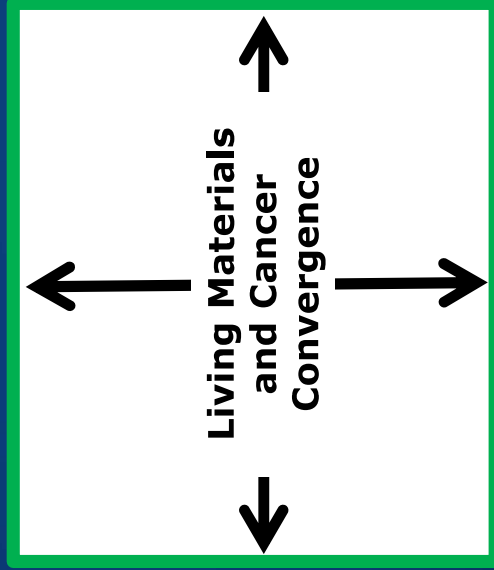


DMR and Biotechnology – Collaborations with NCI & NIBIB

BioMaterials & Soft-CMP
Communities

Synthetic & Systems
Biology

Cancer Biology
Community



Funding Agencies
(NSF, NIH)

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



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 a 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

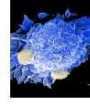
SQT - Windows on the Cell

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 (Kishu) 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

Critical Aspects of Sustainability (CAS)

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

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



This Photo by Unknown Author is licensed under CC BY-NC

The DMR Polymers Program has been among the leaders of cross-NSF initiatives on sustainability over the decades –

- *Technology for a Sustainable Environment (joint with EPA, 1996-2000);*
- *Sustainable Chemistry, Engineering, and Materials (2011-2016);*
- *Critical Aspects of Sustainability (2018-now)*



Solid State and
Materials Chemistry

Brigit
Schweser



Robert
Meulenbreg

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rmeulenb@nsf.gov



Ceramics

Na Jamin
Bassiri-Gharib

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Polymers

Andrew J.
Lovinger

alovinge@nsf.gov



Christopher
Ober

cober@nsf.gov



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.



dhess@nsf.gov

aklirono@nsf.gov

rhoy@nsf.gov

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



DMR Investments in the Materials Cyberinfrastructure (CSSI)

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

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

December 16, 2022

December 01, 2023

December 1, Annually Thereafter



Daryl Hess

dhess@nsf.gov

•**Elements:** Targets small groups that will create and deploy robust services for which there is a demonstrated need, and that will advance science and engineering. (max \$600k/3yrs)

•**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 science and engineering and resulting in a sustainable community framework providing CI services to a diverse community or communities. (between \$600k - \$5M over 3-5yrs)

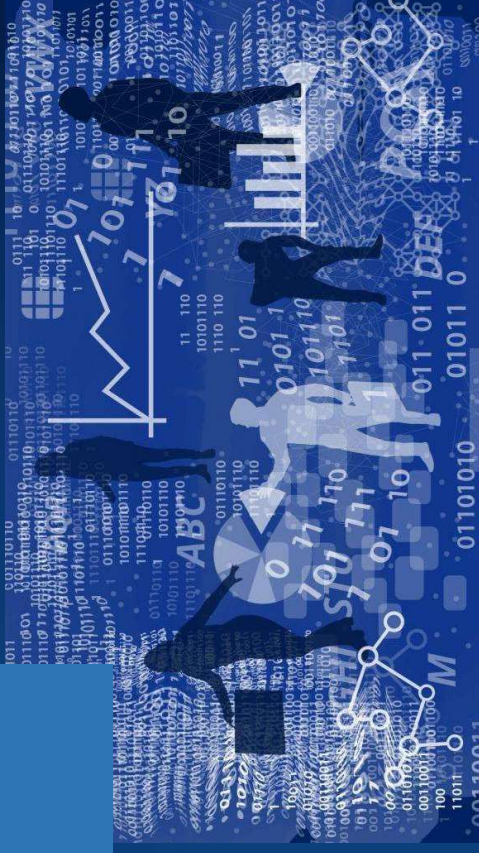
•**Transition to Sustainability:** Targets groups who would like to execute a well-defined sustainability plan for existing CI with demonstrated impact in one or more areas of science and engineering supported by NSF. The sustainability plan should enable new avenues of support for the long-term sustained impact of the CI. (max \$1M/2yrs)

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>



aklirono@nsf.gov



National Artificial Intelligence Research Institutes – NSF 23-610

- <https://new.nsf.gov/funding/opportunities/national-artificial-intelligence-research>
- Max of 2 prelim proposals per institution as lead; abt/ \$4M/yr for 4-5yrs
- **Group 1** – Awards expected FY24: prelim due 31 October 2023
 - Theme 1: *AI for Astronomical Sciences* (2) w/ Simons Foundation
 - Full proposal due **16 February 2024; awards anticipated in FY24**
- **Group 2** – Awards expected FY25: prelim due 12 January 2024
 - **Theme 2: *AI for Discovery in Materials Research* (1) w/ Intel**
 - Theme 3: *Strengthening AI* (2) w/ CapitolOne, NIST
 - Full proposal due **17 May 2024; awards anticipated in FY25**

Serdar Ogut
sogut@nsf.gov

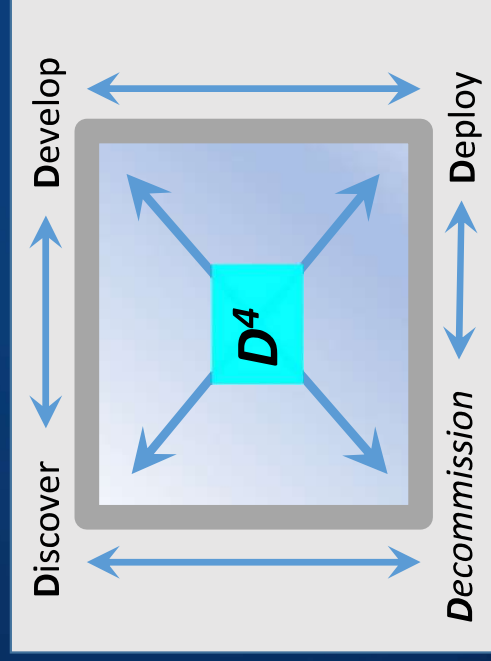


National Artificial Intelligence Research Resource (NAIRR) Pilot

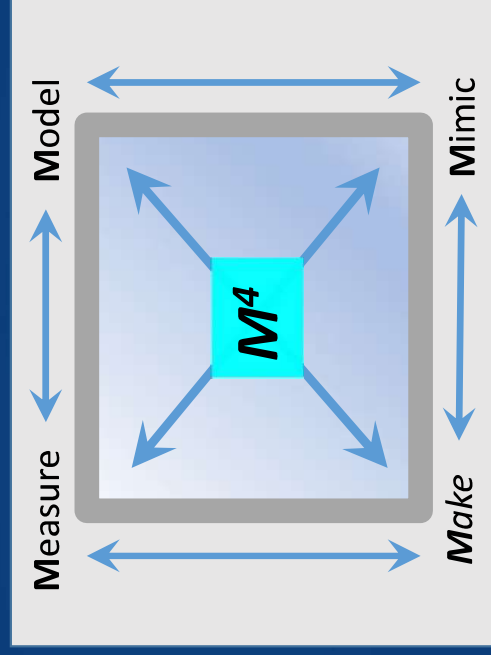
- A shared national research infrastructure for responsible discovery and innovation in AI.
 - NAIRR Pilot webpage hosted by NSF: <https://new.nsf.gov/focus-areas/artificial-intelligence/nairr/>
 - NAIRR Pilot portal: <https://nairrpilot.org/>. This website provides education community on latest NAIRR Pilot opportunities and usable resources (see below).
 - NAIRR Pilot announcements mailing list: nairr_pilot_announcements@listserv.nsf.gov
 - Subscribe for updates: nairr_pilot_announcements-subscribe-request@listserv.nsf.gov
 - Questions about the NAIRR pilot can be sent to nairr_pilot@nsf.gov.



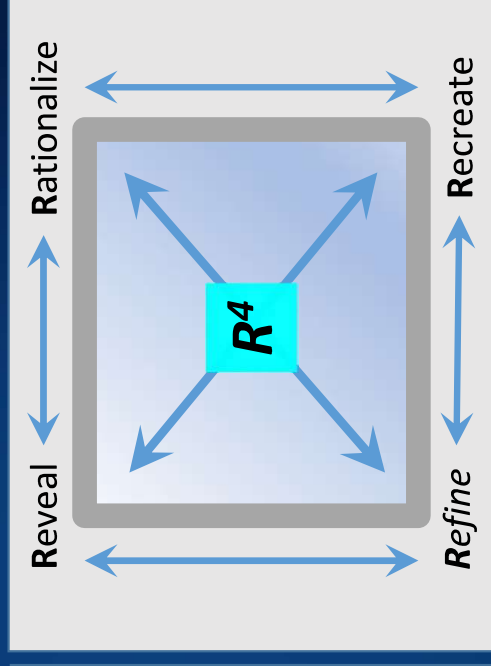
DMR: Navigating the Frontier = $(DMR)^4$



What we do.



How we do it.



Why we do it.

Convergence: Useful Metaphor

Fruit



Disciplinary

Fruit Bowl



Multi-disciplinary

Fruit Salad



Inter-disciplinary

Smoothie



Convergence

Curiosity-Driven vs Use-Inspired Research

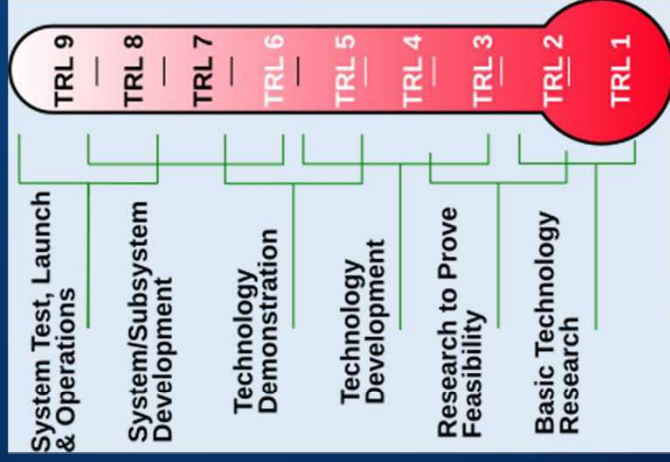


New Piece!
What are the possibilities?

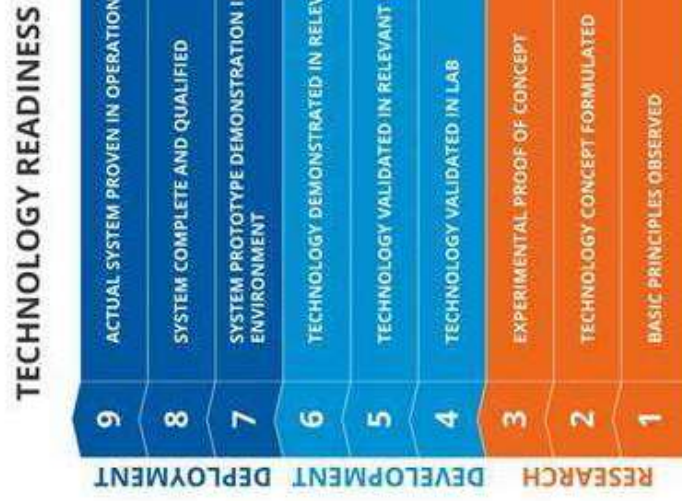


Need this Piece!
Find it or make it.

Technology Readiness Level (TRL) – For Materials?

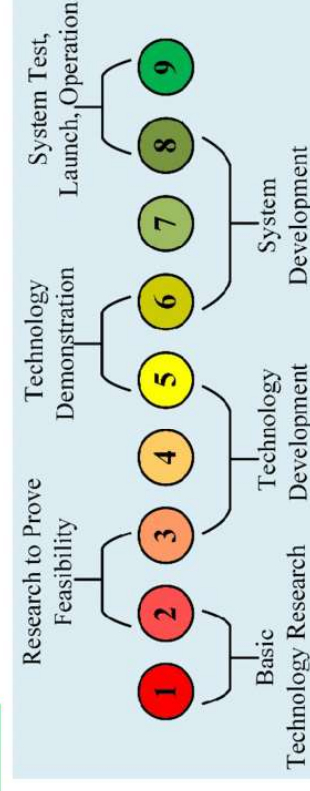
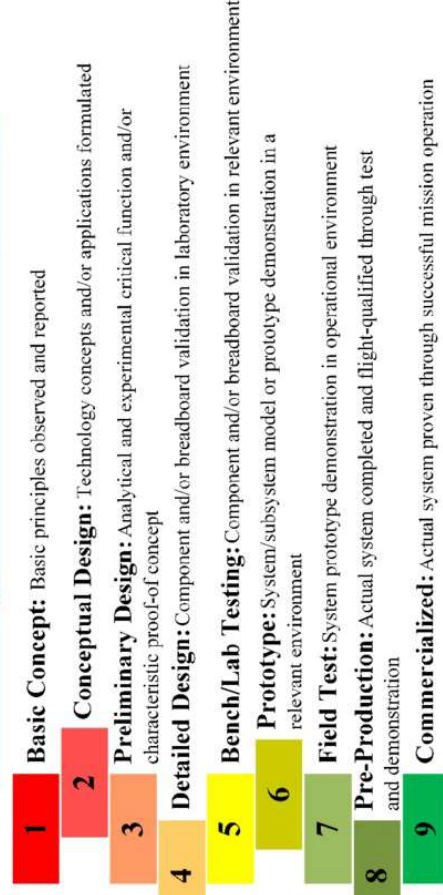


NASA

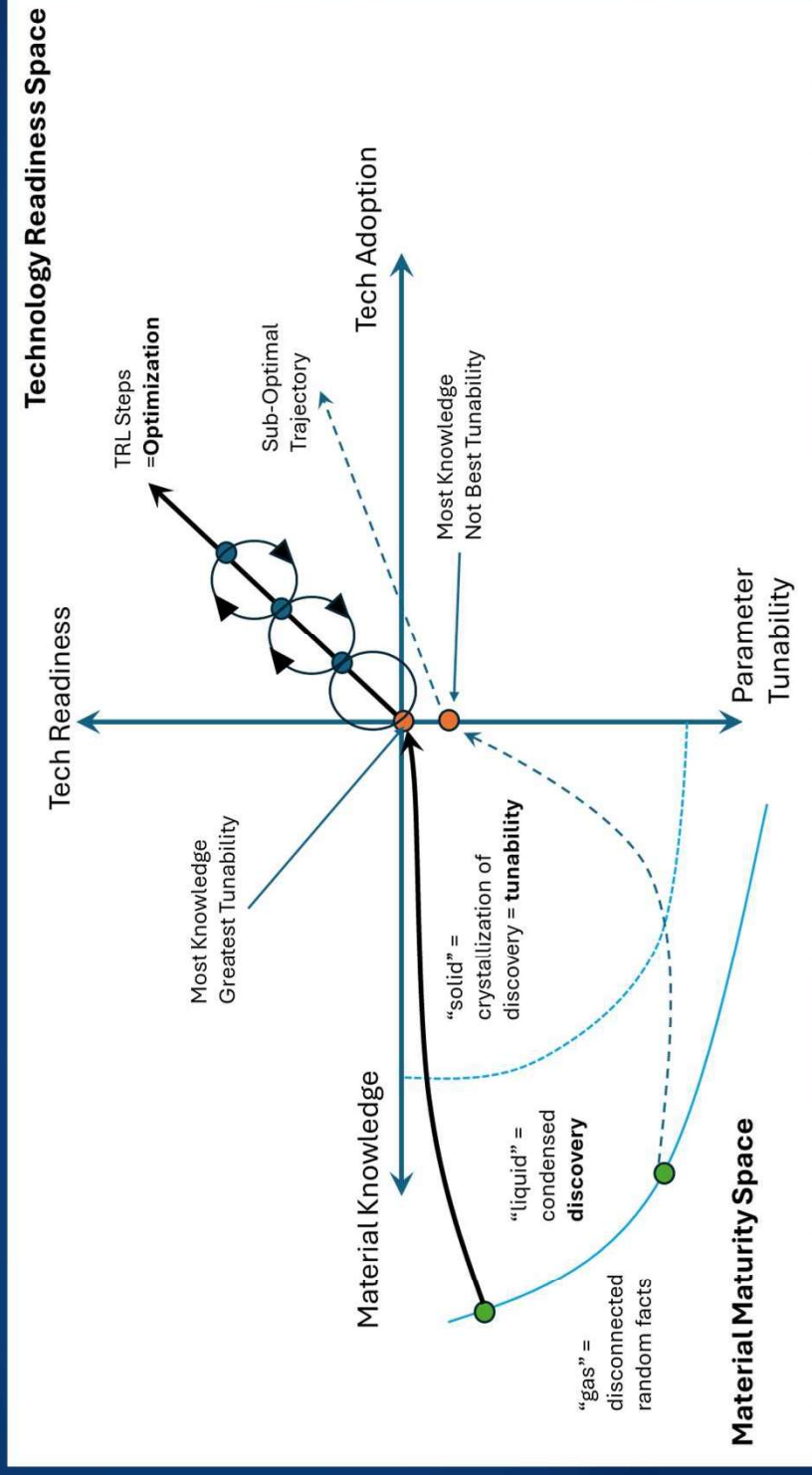


EXXON

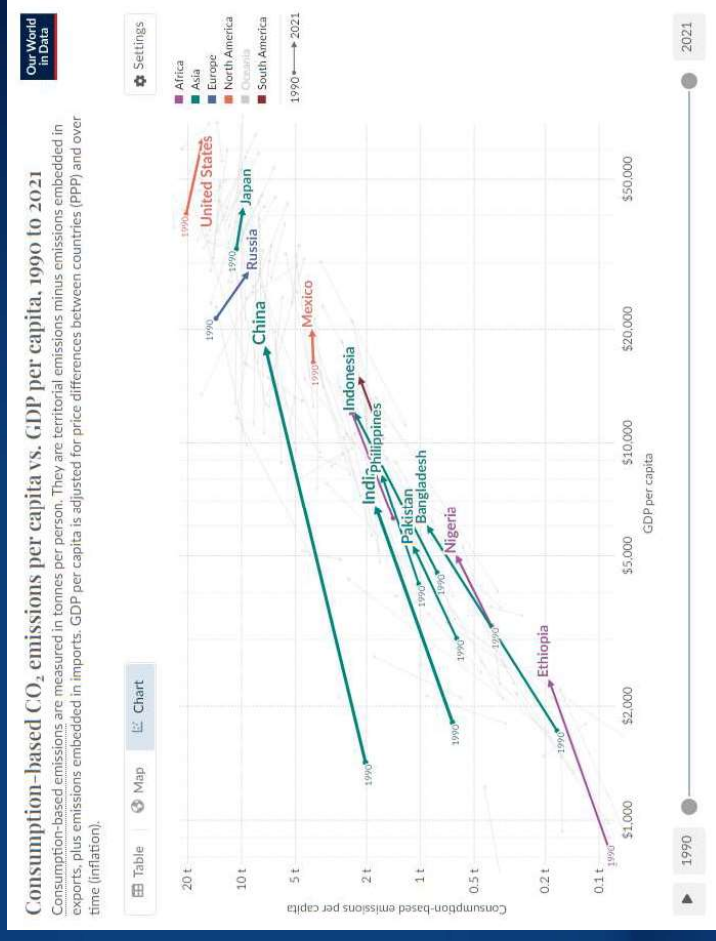
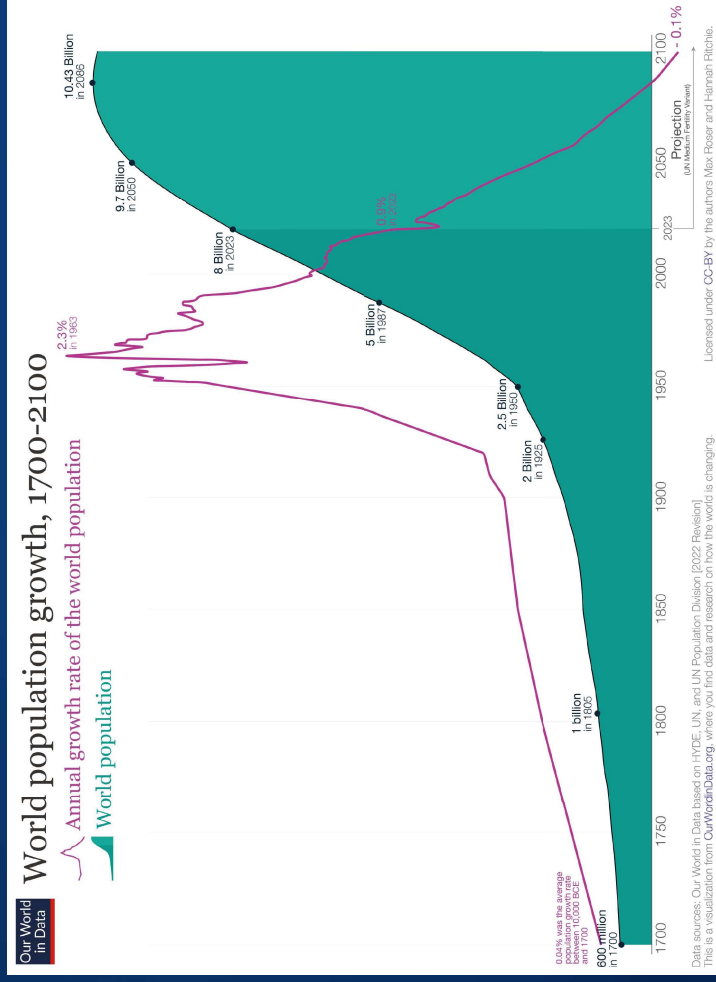
Technology Readiness Levels (TRL)



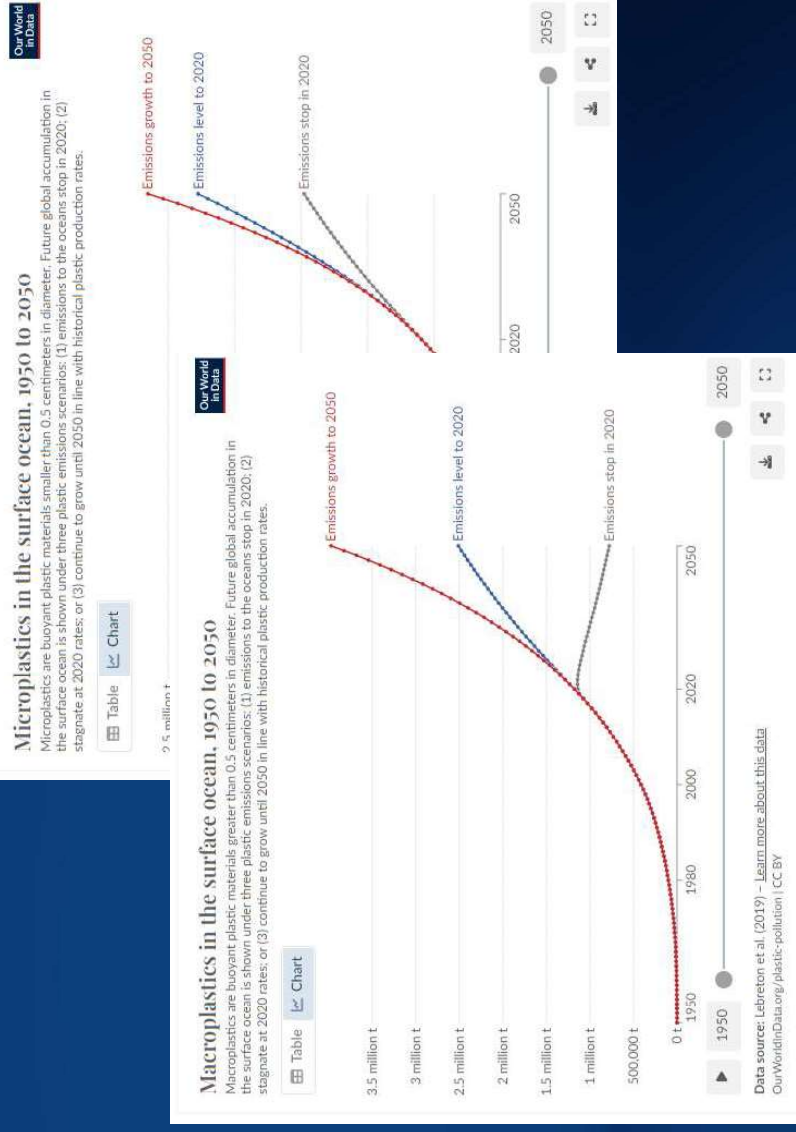
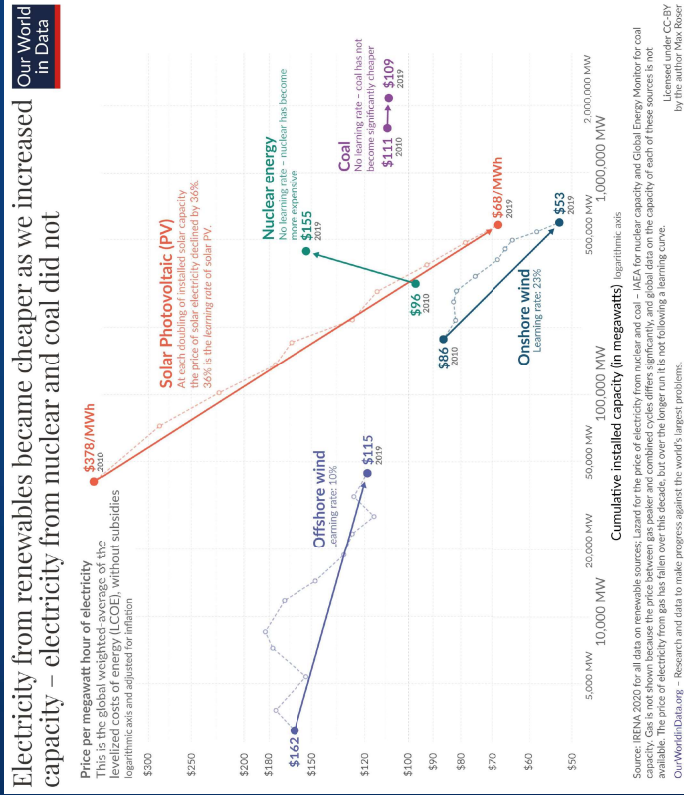
Materials Maturity Level (MML): Phase Diagram



Need for Everyone – People are all that matter



Progress Made – Progress Needed

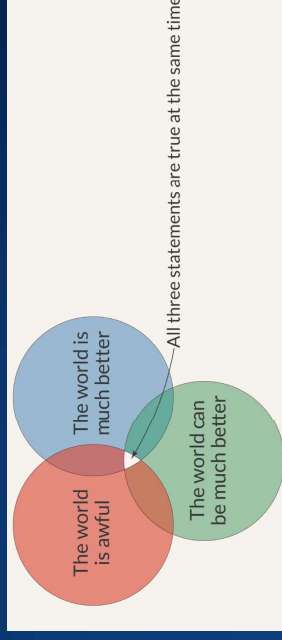




“It was the best of times, it was the worst of times, it was the age of wisdom, it was the age of foolishness, it was the epoch of belief, it was the epoch of incredulity, it was the season of light, it was the season of darkness, it was the spring of hope, it was the winter of despair.”

— Charles Dickens, *A Tale of Two Cities*

tags: comment-of-the-times



Our World
in Data

Globally 4.3% of all children die before they are 15 years old.
5.9 million children die every year.

→ The world is awful

Globally 4.3% of all children die
Today 4.3% of all children die

In the past around 50% of all children died

→ The world is much better

Globally 4.3% of all children die
In the European Union 0.45% of all children die.

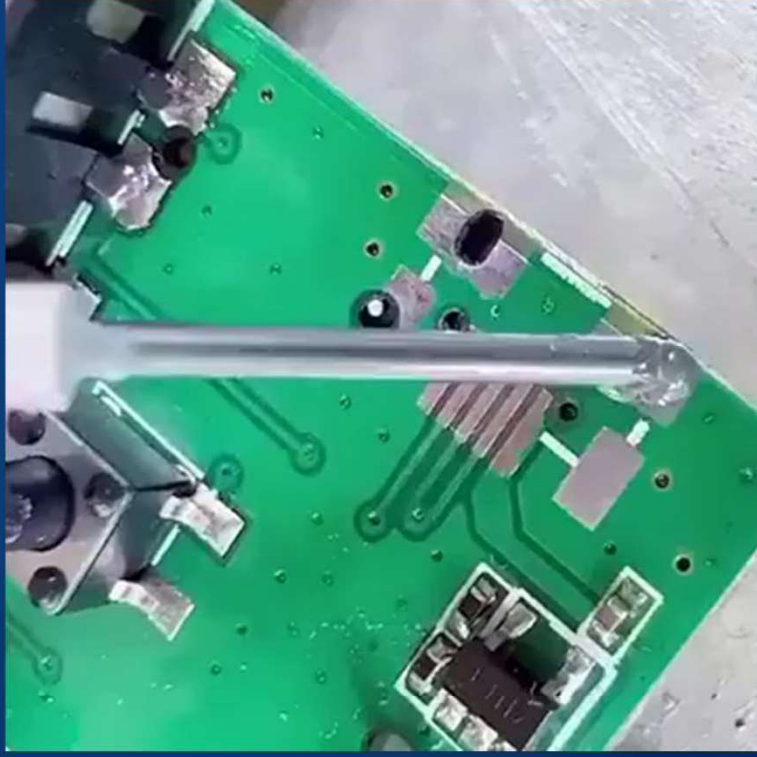
→ The world can be much better

Data: 2020 data from UN IGME and historical data from Volk and Atkinson (2013).
OurWorldinData.org – Research and data to make progress against the world's largest problems.

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DMR: Inspiration and Impacts



Materials Science is the science of the stuff that makes up the universe around us.

Exploring this frontier directly enables the stewards of this planet to make the

dangerous, safe;

dirty, clean;

expensive, cheap;

scarce, plentiful;

and the future, **bright.**

FINE

