DMR DIVISION OF MATERIALS RESEARCH

DIRECTORATE FOR MATHEMATICAL AND PHYSICAL SCIENCES

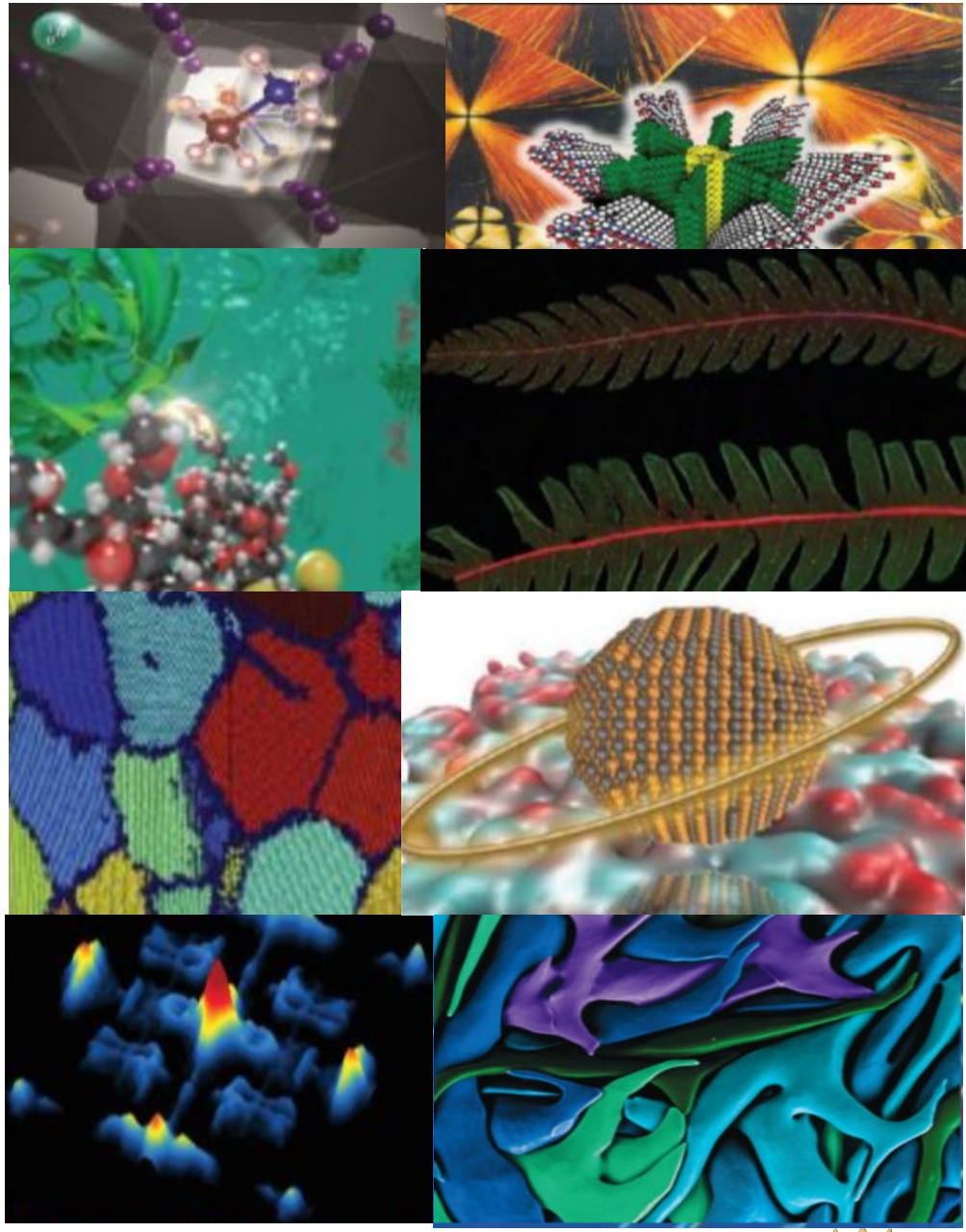
DMR Update

Linda S. Sapochak, Ph.D.

Director, Division of Materials Research

Mathematical & Physical Sciences Directorate

National Science Foundation



Where Materials Begin & Society Benefits!

Alex Klironomos named Deputy Division Director in May 2020. Former APS journal editor and CMMT Program Director.

Division of Materials Research (DMR)

OFFICE OF THE DIVISION DIRECTOR




[illegible] Sapochak, Division Director
Alex Klironomos, Acting Deputy Division Director
Neila Odom-Jefferson, Operations Specialist
Velma Lawson, Program Support Manager

ADMINISTRATIVE UNIT









Meghan Ackerman, Program Specialist
Benita Fair, Program Analyst
Christopher Finta, Program Specialist
Claudia Johnson, Contractor
Allison Smith, Program Specialist
Catherine Williams, Program Analyst
Iloria White, Student
Syeda Shah, Program Specialist
Maria Matthews, Contractor

PROGRAM DIRECTORS

National Facilities and Instrumentation



Leonard Spinu
Guebre X. Tessema
Charles Ying

Materials Research Science and Engineering Centers

Daniele Finotello
Miriam Deutsch

Partnerships for Research and Education in Materials

Debasis Majumdar

Designing Materials to Revolutionize and Engineer our Future

John Schlueter

Recruiting PD

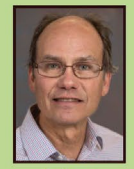
Last Updated: 03/31/2020

Condensed Matter Physics



Tomasz Durakiewicz
Germano Iannacchione
Tom Oder

Electronic and Photonic Materials




Robert Opila
James Edgar

Condensed Matter and Materials Theory



Daryl W. Hess
David Rabson
Serdar Ogut

Polymers

Andrew J. Lovinger

Solid-State and Materials Chemistry


Birgit Schwenzer
Catherine Oertel

Metals and Metallic Nanostructures

Judith Yang

Biomaterials


Steve Smith
Randy Duran

Ceramics

Lynnette Madsen

Cross-Cutting Activities

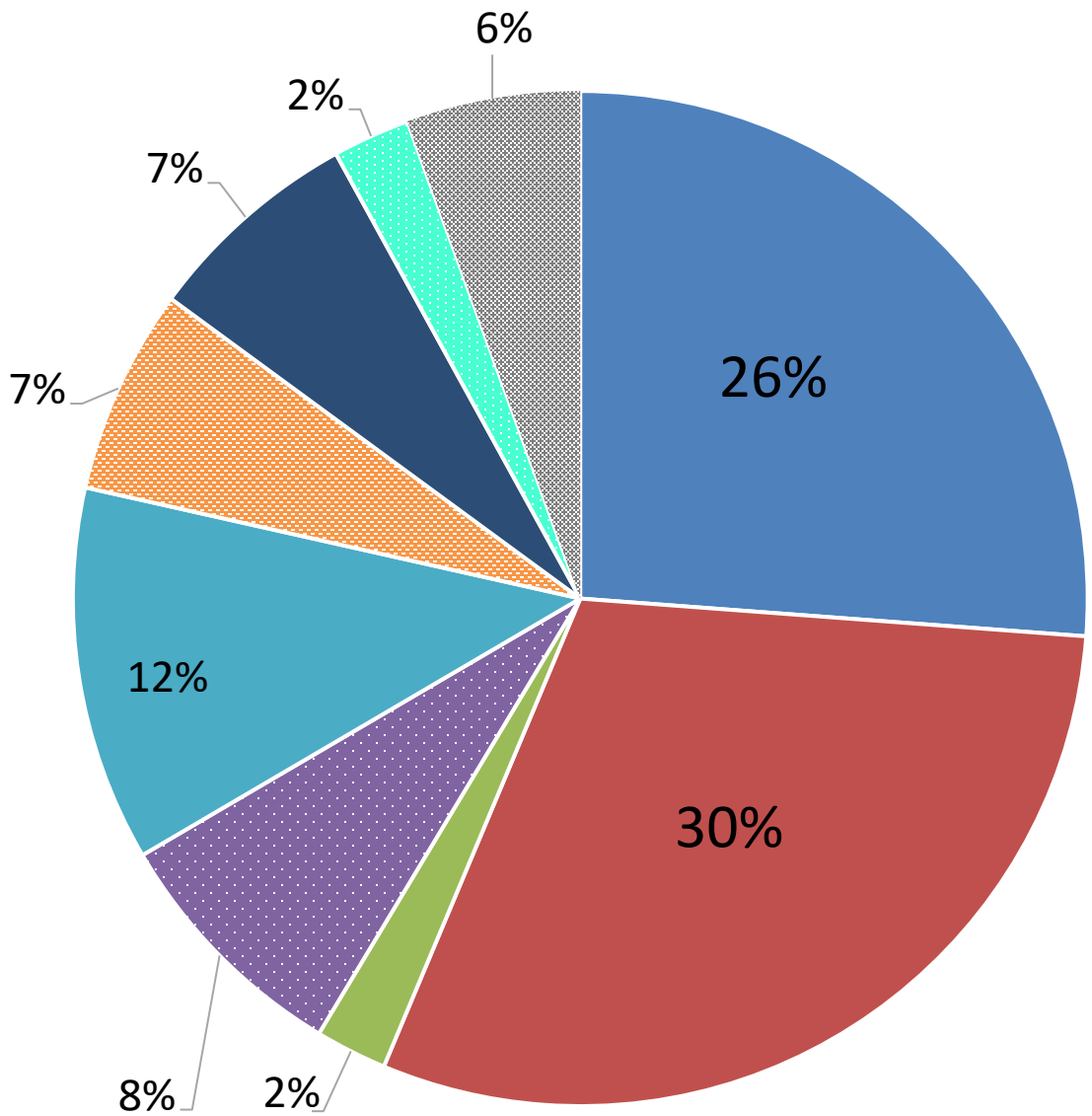
Divisional

Additional Scientific Staff



Krystle Wilson
Paul Sokol
Shadi Mamaghani

PI Departmental Affiliations



- Physics
- Chem/Chem Eng
- Biomedical Engineering/ Biochem/Bio
- Mechanical Eng
- Materials Eng/Science
- Elec Eng/Comp Sci/Math
- Other Eng and Science
- Centers, Institutes, Industry
- Unknown

Materials Research Science and Engineering Centers (MRSEC)

PROGRAM SOLICITATION
NSF 19-517

REPLACES DOCUMENT(S):
NSF 16-545

National Science Foundation

Directorate for Mathematical & Physical Sciences
Division of Materials Research

National Science Foundation
MRSEC
Materials Research Science and Engineering Centers

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

June 24, 2019

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

November 26, 2019

By invitation only

Specifically, it should be stressed that DMR plays an important role in the following NSF Big Ideas:

- *Harnessing the Data Revolution;*
- *The Future of Work at the Human-Technology Frontier;*
- *Understanding the Rules of Life;*
- *The Quantum Leap.*

In addition, potential research topics to broaden the current MRSEC portfolio include, but are not limited to:

- Use of supervised and unsupervised *Machine Learning* addressing materials science complex problems, and in particular as applied to traditional materials science problems in *ceramics, metals, metallic alloys* and others.

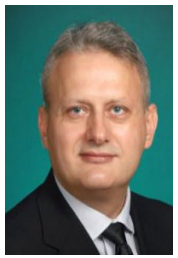
Finally, a few additional strategic research areas of DMR interest have also been identified:

- *Synthetic Materials Biology*: in such an effort biologists and system engineers work with materials scientists to identify materials challenges hindering advancements of Synthetic Biology, as well as to generate new Synthetic Biology approaches to materials development i.e., "Materials Biology";
- *Structural Materials under Extreme Conditions*: this effort addresses fundamental challenges in ceramic, metallic, and polymeric materials and their composites for applications under extreme conditions;
- *Recyclable Plastics and Alternative Materials for Sustainable Development*: these efforts could include the development of intrinsically recyclable polymers, a better understanding of mechanical properties of recycled plastic products, strategies to improve the properties of recycled plastics, and materials alternatives for plastics.


Dan Finotello


Miriam Deutsch


Birgit Schwenzer


Leonard Spinu

Designing Materials to Revolutionize and Engineer our Future (DMREF)

PROGRAM SOLICITATION
NSF 19-516

REPLACES DOCUMENT(S):
NSF 16-613

Over 500 proposals (300 projects)

National Science Foundation

Directorate for Mathematical & Physical Sciences
- Division of Materials Research
- 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 & Information Science & Engineering
- Office of Advanced Cyberinfrastructure
- Division of Computing and Communication Foundations
- Division of Computer and Network Systems
- Division of Information & Intelligent Systems

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

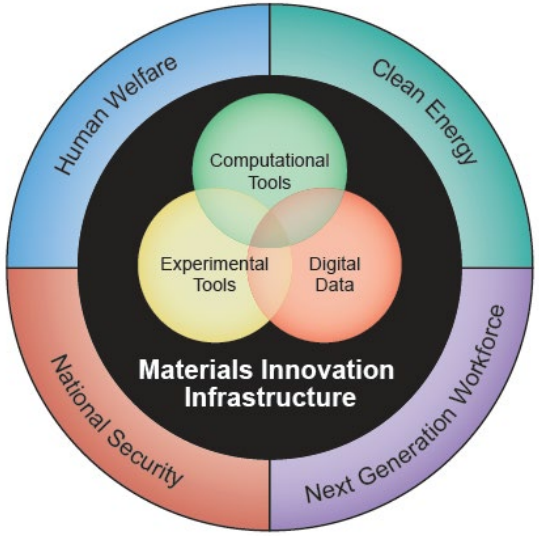
January 28, 2019 - February 04, 2019

$52M FY19 awards

MGI PI Meeting
FY20, March 30-31
U of Maryland

Next competition
2021

NSF's response to MGI!



John Schmeter

- Awards are now 4 year duration, up to $1,750,000.
- Opportunity for PIs to engage Google Cloud resources
- Strategic Areas of Interest: Synthetic Materials Biology, Structural Materials Under Extreme Conditions, Recyclable Plastics & Alternative Materials for Sustainable Development, Robotic Materials.

Planning a Decadal Study

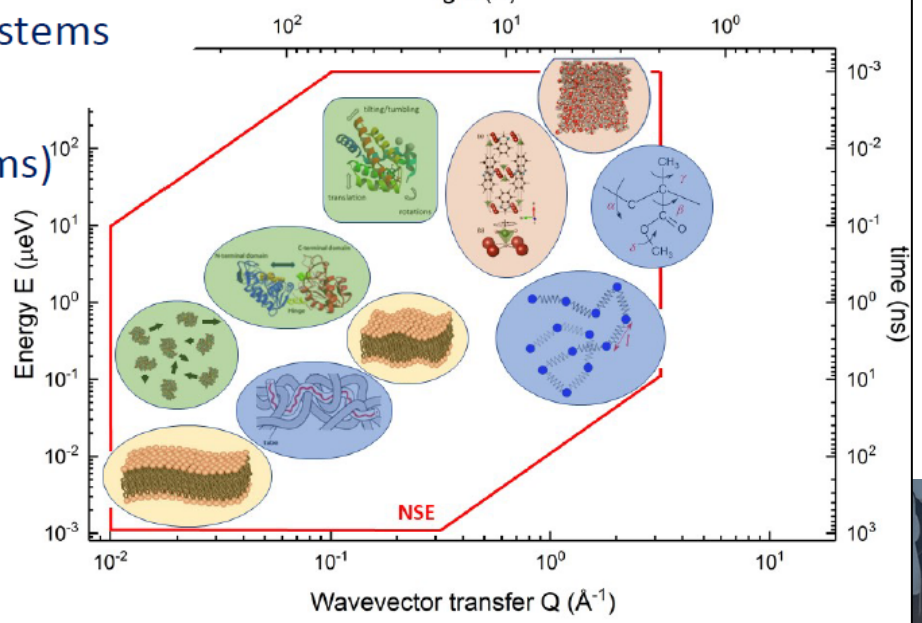
Midscale Research Infrastructure - 1

"... the first in NSF's agency-wide effort to support the mid-range infrastructure that will be invaluable to strengthening the U.S. scientific research enterprise, ... These projects fill gaps and provide unique research capabilities for the U.S that will engage many early-career scientists and engineers in the pursuit of ground-breaking discoveries."
Jim Ulvestad, National Science Foundation chief officer for research facilities.

Mid-scale RI:1 (M1:IP): A world-class Neutron Spin Echo Spectrometer for the Nation

- Coherent Dynamics
  - Density Fluctuations corresponding to some SANS
    - Diffusion
    - Shape Fluctuations (Internal Dynamics)
    - Polymer Dynamics
  - Liquid and Glassy Systems
- Incoherent Dynamics
  - Self-Dynamics (H atoms)
- Magnetic Dynamics
  - Spin Glasses

Soft Matter

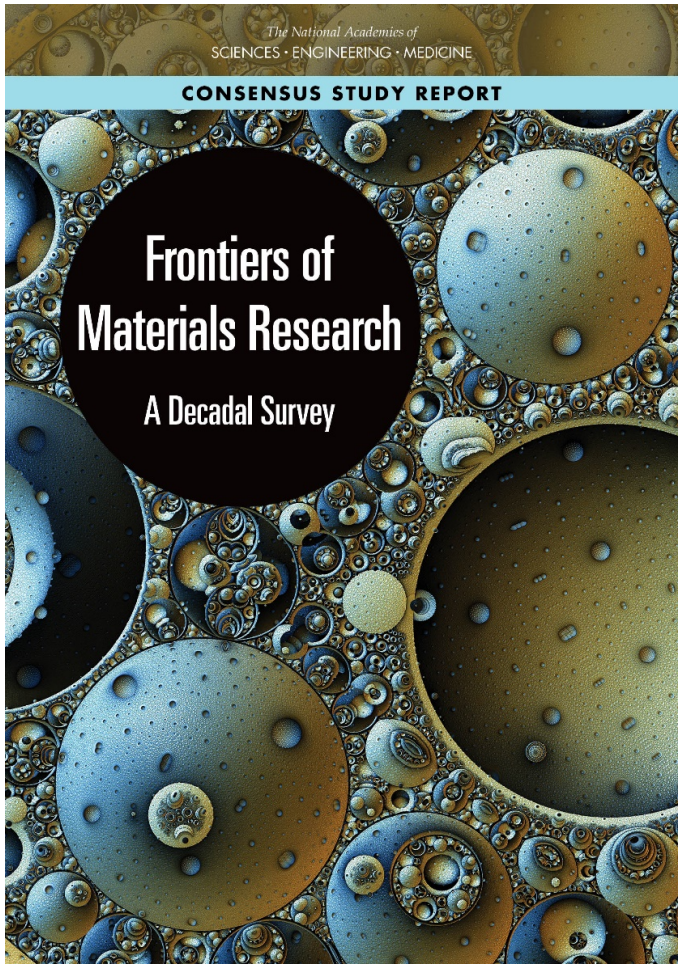


$11M

PI: Norman J. Wagner

CHRNS Center for High Resolution Neutron Scattering NIST

(1) feedback to our recent studies for you



Broad Recs:

- Increased coordination across all sectors –especially industry
- Support for Interagency Polymer Decadal Study (POL/NSF lead)
- Mid-scale infrastructure
- Sustainable Material Development
- Computation and Data Science
- High-throughput syn/characterization
- **Quantum Materials**
- Hybrid/Composite Materials
- Advanced Manufacturing

Mid-Scale Research Infrastructure Program – strong response from MR community

Critical Aspects of Sustainability (CAS) meta program and DCL- NSF20-050

AI Institutes & planning grants solicitation- NSF20-503

New - **DMR Data Management Plan**

New Materials Innovation Platforms (MIPs)– NSF19-526- to be announced later this year

Future Manufacturing solicitation-NSF20-552

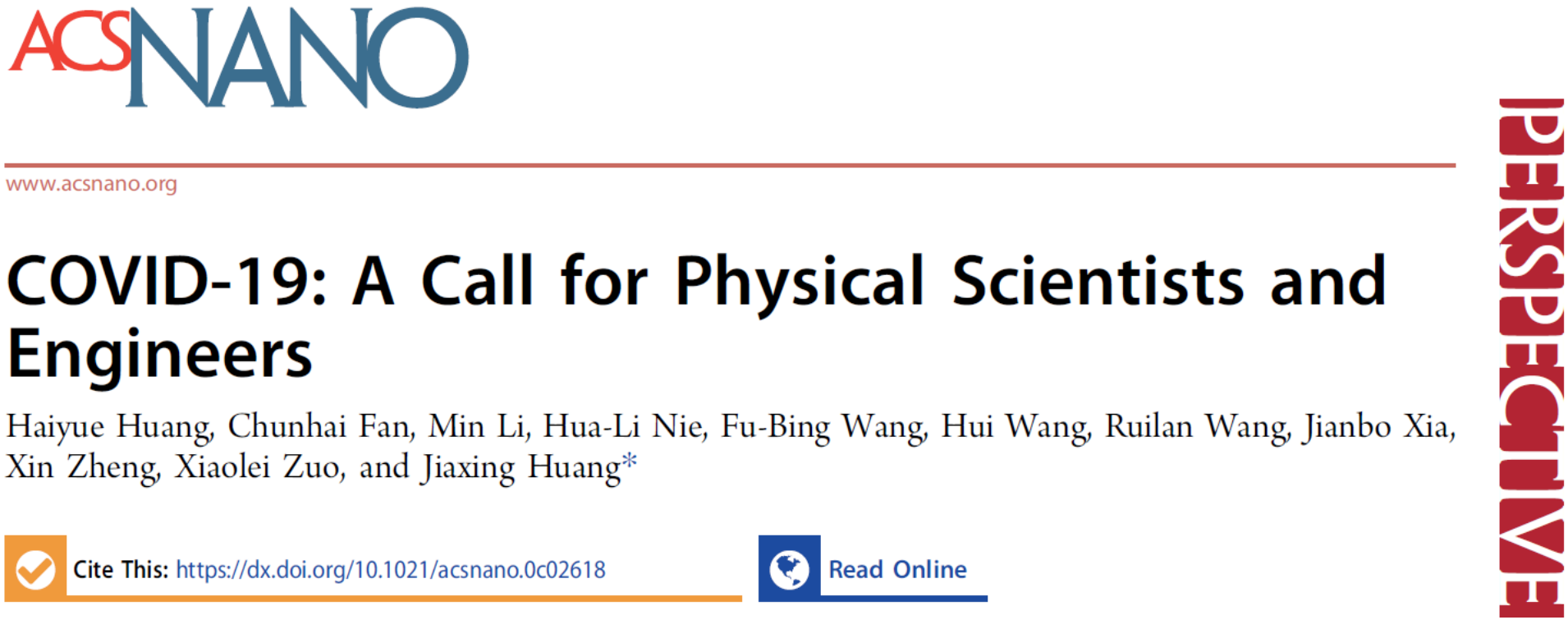
Hybrid Materials Workshop/Solid State and Materials Chemistry- MRS bulletin

(2) how national initiatives such as QIS, AI/ML, exascale computing, and microelectronics (and others?) are impacting your programs, including the extent to which these initiatives are bringing with them new funding vs. unfunded mandates

- **National Quantum Initiative (NQIA)** - amplifies the efforts started with NSF Big Idea – The Quantum Leap. QIS funds are expected.
- **Materials Genome Initiative (MGI)** – OSTP decided to keep this subcommittee – important that MGI underlies the success of other initiatives- Advanced Manufacturing & AI, Bioeconomy. No new money. New strategic plan being prepared.

- **Advanced Manufacturing Initiative (AMI)** – New monies to support Future Manufacturing solicitation
- **American Artificial Intelligence Initiative (AII)** – New monies to support the AI Institutes solicitation
- **Biotechnology/Bioeconomy** – Industries of the Future – plan to participate: searching for *soft CMP and POL* Program Directors- cross disciplinary

(3) any comments you're prepared to make on the impacts the coronavirus is expected to have on your programs



Questions?