Division of Materials Research

Ian Robertson
Division Director

Division of Materials Research 2012

Ian Robertson
Division Director

Janice Hicks
Deputy Division Director

Office of Materials Instrumentation and National Facilities

Charles Bouldin

Guebre X. Tessema

Thomas P Rieker

Large Facilities office

Office of Special Programs

Michael Scott

Carmiña Londoño

Materials Research Centers and Teams

Sean L. Jones

Mary Galvin

John Snyder

AAAS **Fellow**

Ashley White

Individual investigator programs

Ceramics

Lynnette Madsen

Electronic and Photonic Materials

Nadia El-Masry

Z. Charles Ying

Polymers

Andrew Lovinger

Biomaterials

Joseph Akkara

David Brant

Condensed Matter and Materials Theory

Daryl Hess

Diana Farkas

Serdar Ogut

Metal and Metallic Nanostructures

Eric Taleff

Condensed Matter Physics

Daniele Finotello

Solid State and Materials Chemistry

Linda Sapochak

Openings in DMR

- Biomaterials
- Electronic and Photonic materials
- Soft Matter Theory
- Condensed Matter Physics

- DIVISION DIRECTOR (Contact: J. Hicks at jhicks@nsf.gov)

SEND A CV TO THE DIVISION DIRECTOR,

see http://www.nsf.gov/about/career_opps/rotators/index.jsp#

DMR Members of the Mathematical and Physical Sciences Advisory Committee 2012

Juan dePablo
Wisconsin

Elsa Reichmanis
GA Tech

George Crabtree
Argonne Nat'l Lab

Naomi Halas
Rice

CONTACT WITH YOUR IDEAS AND SUGGESTIONS

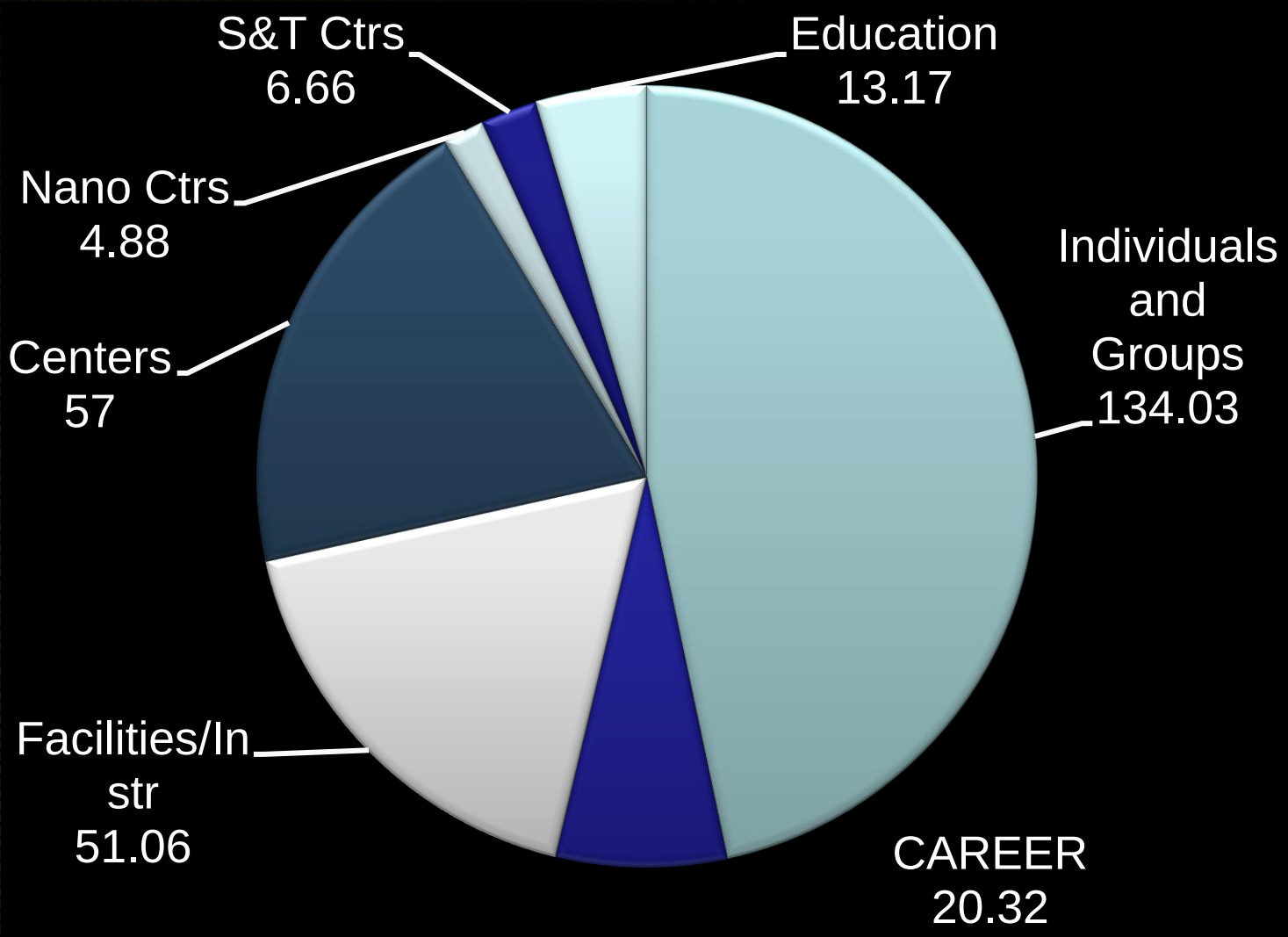
Sharon Glotzer
Michigan

Mathematical and Physical Sciences FY 2013 Budget Request

	FY 2011 Actual	FY 2012 Current Plan	FY 2013 Request	Change FY 2012 to FY 2013
Division of Astronomical Sciences (AST)	$236.78	$234.55	$244.55	4.3%
Division of Chemistry (CHE)	$233.55	$234.06	$243.85	4.2%
Division of Materials Research (DMR)	$294.91	$294.55	$302.63	2.7%
Division of Mathematical Sciences (DMS)	$239.79	$237.77	$245.00	3.0%
Division of Physics (PHY)	$280.34	$277.37	$280.08	1.0%
MPS Total	**$1,312.42**	**$1,308.94**	**$1,345.18**	**2.8%**

FY 2013 NSF Research and related activities 5.2%

DMR BUDGET

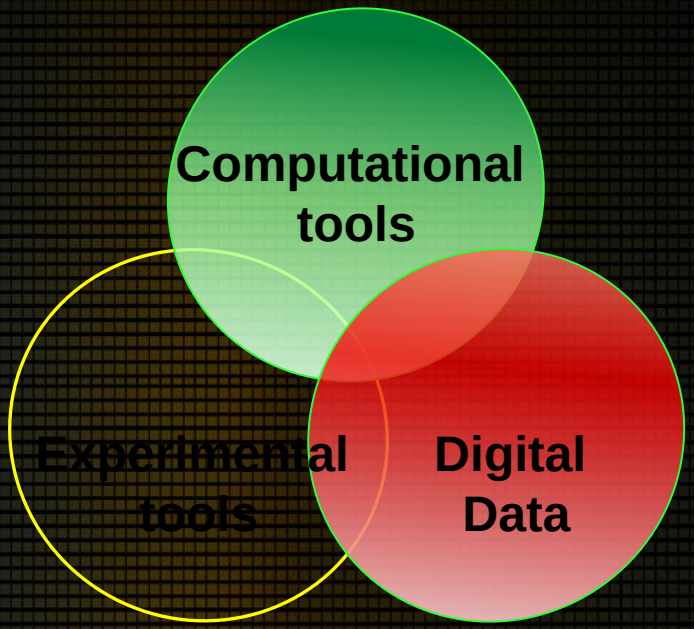


FY 2011: $287 M

Discovery

FY 13

Materials Genome Initiative
Designing Materials to Revolutionize and Engineer our Future
(within OneNSF CEMMSS initiative)



FY 13 BUDGET REQUEST
MPS $20 M; ENG ~$15

Partners: DMR, CMMI, CHE, ECCS, CBET DMS, OCI and CISE

Activities:
May 14-15 Data workshop NIST
Data Charrette – NSF MPS, ENG, BIO, OCI, CISE
Workshop on “Opportunities Enabled by the Materials Innovation Infrastructure”
Workshop on “Data Challenges”

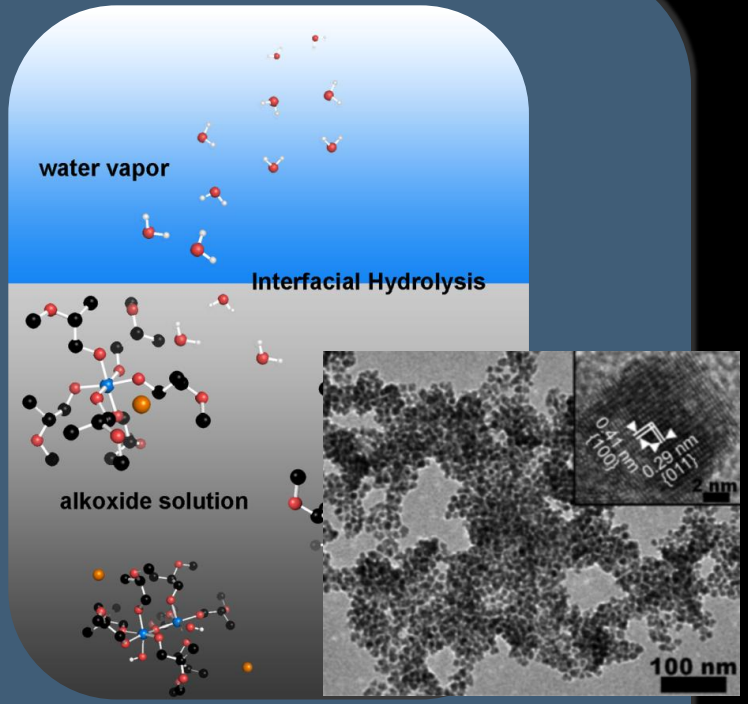
Interdisciplinary

Science, Engineering, and Education for Sustainability (SEES):

Interdisciplinary basic research in science, engineering and education aimed at meeting present needs without compromising the ability of future generations to meet their own needs.

SusCHEM: Sustainability Research in chemistry, Engineering and Materials -
Examples: Seek new (non-petroleum based) sources of important raw materials; discover new environmentally benign synthesis and processing that require less energy, water and organic solvents; designing processes up front to include recovery and recycling.
Workshop: January 2012, report coming
PAST SOLICITATIONS

- Sustainable Energy Pathways NSF 11-590 Teams of 3; address 2 main issues; $0.5M/yr for 4 years; due to run every other year
- SEES Post-doc Fellows NSF 11-575 2 mentors in different disciplines, affiliate with a center/ind/international; due to run every year.
- Sustainability Research Networks NSF 11-574 "think tank" $12M over 4-5 years (3-4 awards will be made)



$BaZr_xTi_{1-x}O_3$ nanocrystals can be prepared under ultra-benign conditions from a mixture of bimetallic alkoxides using a kinetically controlled vapor diffusion sol-gel method.

Look for DCL's over the summer

Rabuffetti, F. A.; Brutchey, R. L. *Chemical Communications* DOI:10.1039/C1CC14166J.

SusChEM: Sustainability Research in Chemistry, Engineering and Materials

SusChEM Priorities of the NSF Division of Chemistry

- Replace rare, expensive and/or toxic chemicals with earth abundant, inexpensive and benign chemicals
- Economically recycle chemicals that can not be replaced such as phosphorus and the REE's
- Seek new (non-petroleum based) sources of important raw materials
- Discover new environmentally friendly chemical reactions and processes that require less energy water and organic solvents than current practice

SusChEM Priorities of the NSF Division of Division of Materials Research

- Materials for the Preservation and Extension of Natural Resources;
- Material Replacement for a Safer and more Secure Future;
- Improved Materials during Operating Conditions;
- Materials Designed for Zero Waste.

Look for DCL's over the summer

Interdisciplinary

INSPIRE: Integrated NSF Support Promoting Interdisciplinary Research and Education

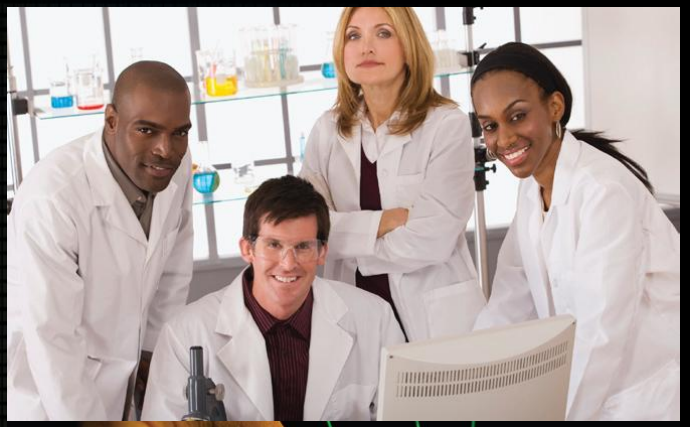
CREATIV: Creative Research Awards for Transformative Interdisciplinary Ventures NSF 12-011

a pilot grant mechanism to support bold interdisciplinary projects in all NSF-supported areas of science, engineering, and education research.

- Only internal merit review is required
- Proposals must be interdisciplinary and potentially transformative
- Requests may be up to $1,000,000 and up to five years duration
- A CREATIV award must be substantially co-funded by at least two intellectually distinct NSF divisions or programs
- YOU MUST CONTACT THE PROGRAM OFFICER(s)
- Submission window: between December 1, 2011, and June15, 2012

Innovation

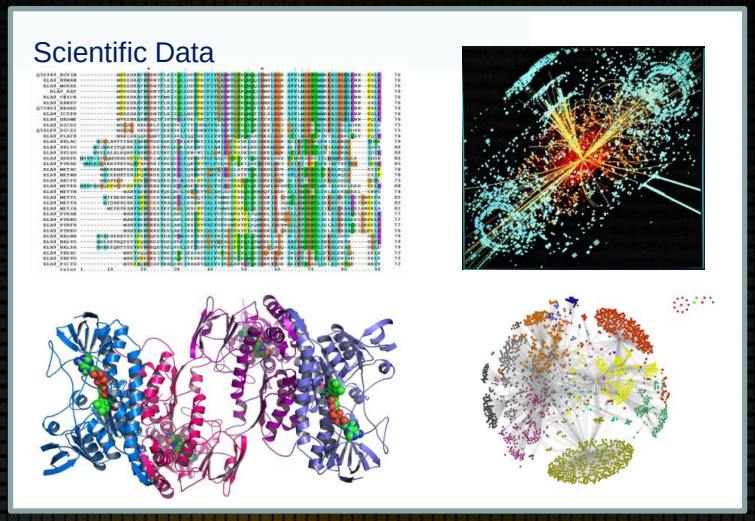
PI, student and mentor learn aspects of developing, organizing and managing a business.
Monthly webinars

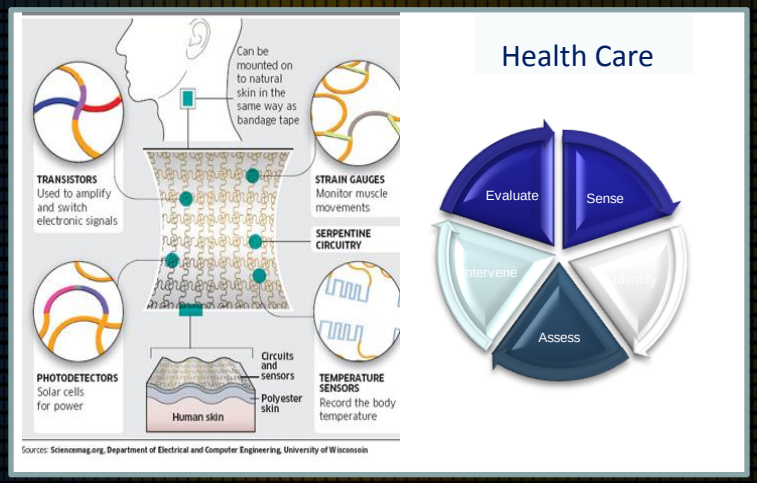


NSF 11-560: I CORPS
5 pages
$50K for 6 mos
4 deadlines/year next:
July 01, 2012 - September 15, 2012

POC. Mary Galvin

Data – what to do with it.





NSF:
http://www.nsf.gov/pubs/2012/nsf12499/nsf12499.htm

Mid-scale projects:

- Due June 13, 2012 (5 p.m. proposer's local time):
- Typically three or more investigators
- Budgets up to $1000,000 (total) per year for up to 5 years

- Small projects:
  - Due July 11, 2012 (5 p.m. proposer's local time)
  - Typically one or two investigators
  - Budgets up to $250,000 (total) per year for up to 3 years.

NIH: http://grants.nih.gov/grants/guide/notice-files/NOT-GM-12-109.html

BIGDATA in context

- BIGDATA solicitation is one component of a national big data strategy
  - Focus: research on core techniques and technologies
- Additional BIGDATA opportunities
  - Computational and Data-enabled Science and Engineering (NSF)
    - CDS&E-MSS: http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504687
    - CDS&E-ENG: http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504770
  - Big data infrastructure projects (NSF)
    - DIBBs: http://www.nsf.gov/pubs/2012/nsf12557/nsf12557.htm
  - Education and workforce development efforts (NSF)
    - IGERT-CIF21: http://www.nsf.gov/pubs/2012/nsf12555/nsf12555.htm
  - Complex multi-disciplinary grand challenge problems
  - Prizes for and competitions
- Other Related Opportunities
  - BISTI: Biomedical Information Science and Technology Initiative (NIH) http://www.bisti.nih.gov/funding/index.asp
  - Additional solicitations and dear colleague letters (NSF): http://www.nsf.gov/cif21

Partnership for Research and Education in Materials (PREM)

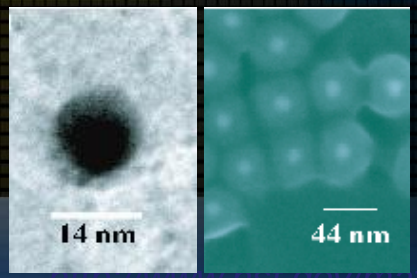
…development of long-term, collaborative partnerships between minority serving institutions and DMR-supported groups, centers and facilities.

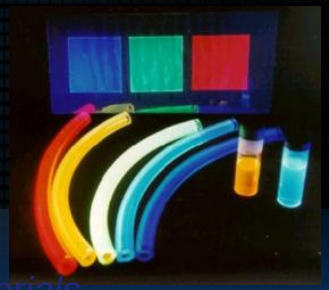
- Partnership with large DMR awards (Materials Centers, Nanoscience Centers, National Facilities, etc).
- Access to state-of-the-art researchers.
- Access to state-of-the-art equipment.
- Funds to provide infrastructure.
- MSIs with robust cyber infrastructure participate in tele-courses and tele-labs.

- Only MSIs are currently eligible to apply.
- Award is managed by MSI (budget, partnership, outreach activity).
- $550k per year for 5 years.
- 14 active awards that engage in research from computation, granular media, energy, plasmonics, biomaterials, etc.
- PREMs located across the US

Next competition: Proposals probably due fall 2014, FY 15 funding.

PI Website: www.prem-mrsec.org





Mathematical and Physical Sciences (MPS) and Alliances for Graduate Education and the Professoriate (AGEP)-Graduate Research Supplement NSF 12-021

Supplement to support a student in MPS disciplines at an institution that has an AGEP award.

Current MPS awardees may apply at any time.

Student must be US citizen, national or permanent resident.

Call your program officer.

Alliances for Graduate Education and the Professoriate (AGEP) Program Director: Jessie DeAro

To develop, implement, and study innovative evidence-based models and standards of STEM graduate education and postdoctoral training experiences designed to improve URM participation, preparation, and success in STEM graduate education and postdoctoral training.

Increase the numbers of URMs entering and completing STEM graduate education and postdoctoral training.

- URMs are African Americans, Hispanic Americans, American Indians, Alaska Natives, Native Hawaiians and other Pacific Islanders
- Male and female URMs, and URMs with disabilities, may require different strategies

Despite increasing trends, URMs are still under represented in various STEM disciplines compared to the available pool of candidates.

- Cannot just wait for representation to catch up.
- We know that there are organizational, societal, and cultural issues that impact participation which can be mitigated

AGEP-Transformation

- Alliance required
- 42 month project (possibility of 12-60 more months)
- Up to $1.75 M depending on scope of project

AGEP-Knowledge Adoption and Translation

- Up to 60 months
- ~$200,000 to $350,000 per year depending on scope of project

AGEP-Broadening Participation Research in STEM Education

- Up to 36 months
- Up to $525,000 total award

Proposals due October 30, 2012

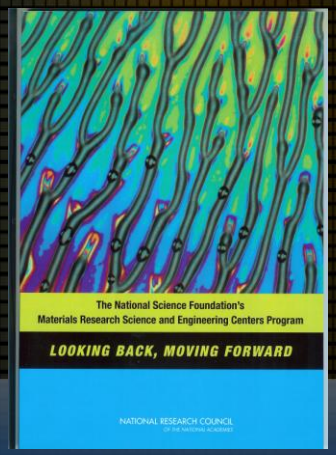
Questions: AGEP@nsf.gov

Interdisciplinary: Materials Research and Engineering Centers (MRSEC)

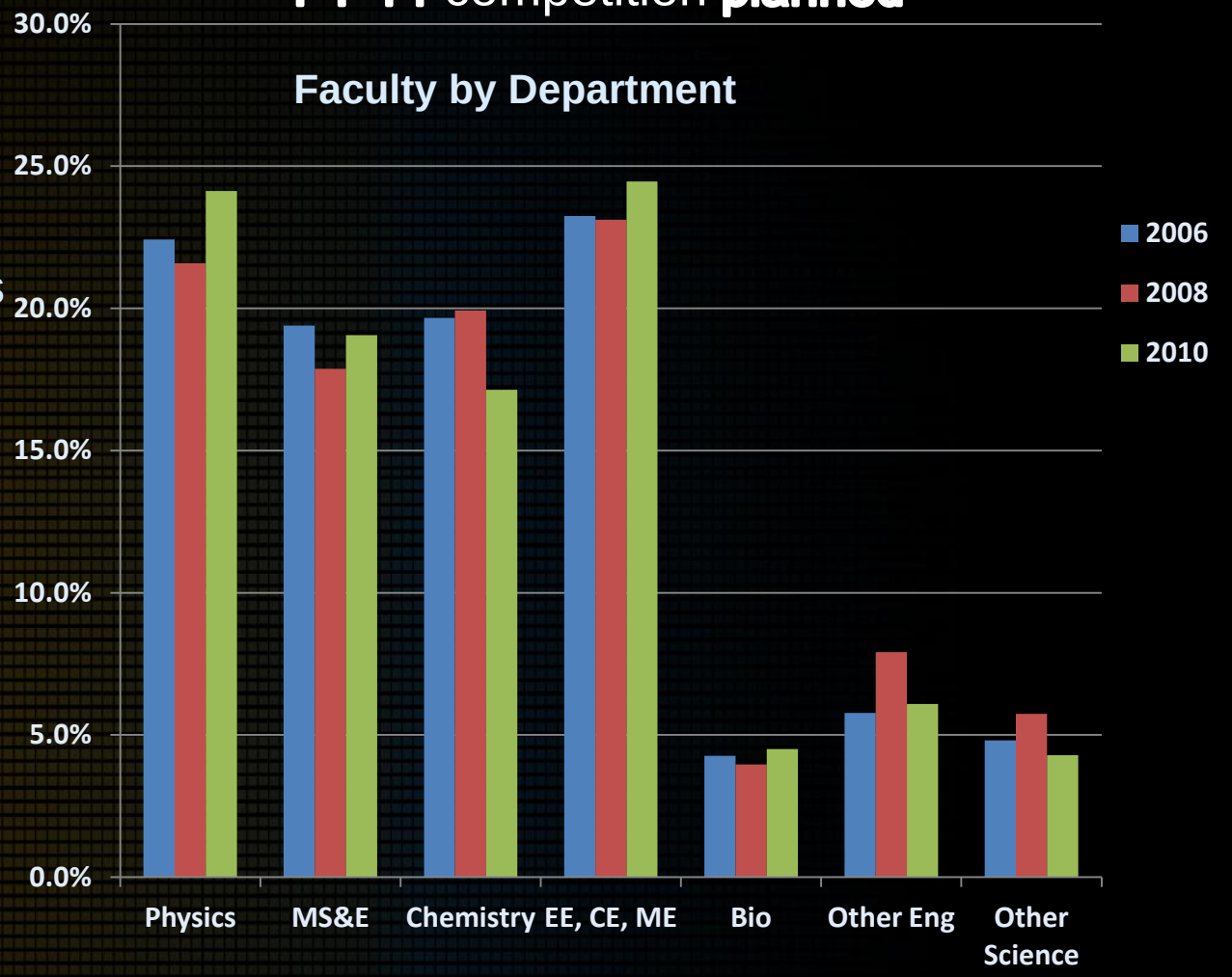
23 MRSECs & 3 MIRTS
- 58 Interdisciplinary Research Groups

2010-2011 Data for 27 Centers

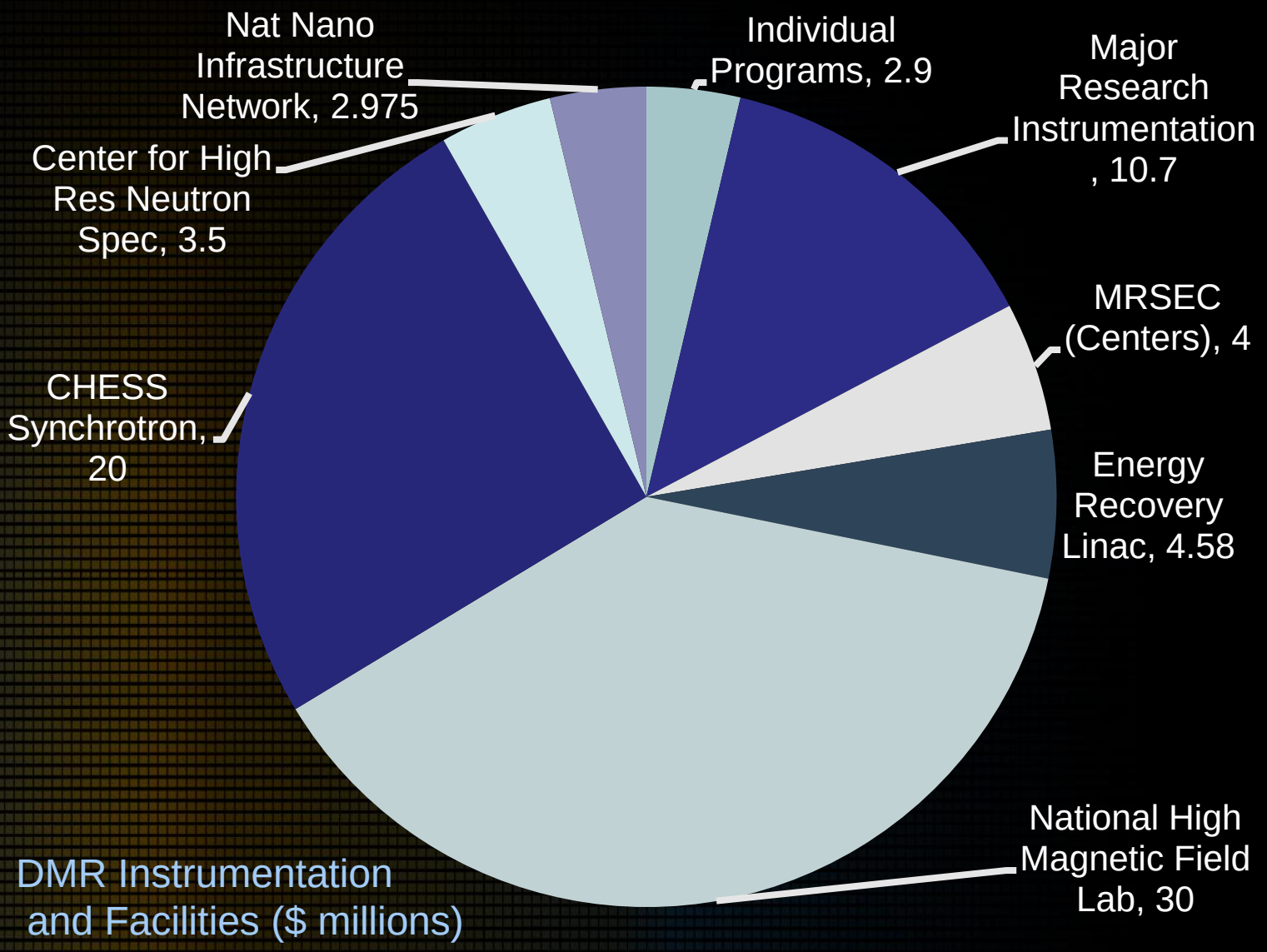
- 901 Faculty participants
- 224 Ph.D.s awarded
- 129 Post-docs completed
- 1500 publications
- 76 patents issued



FY 14 competition **planned**



Infrastructure



Total $78.66 million (26% of total)

Materials 2022

How can the Division of Materials Research (DMR) best utilize its resources to:

1. meet national needs in instrumentation ?
2. provide access to unique instrumentation capabilities through user programs at national facilities ?
3. support acquisition of multi-user instrumentation for the materials community?
4. develop new instrumentation and facilities?
5. support workforce development?

Constraints:

1. Finite budget of DMR and its distribution with the broad portfolio,
2. Other opportunities for funding for instrumentation, acquisition as well as research and development, and user facilities for materials research,
3. No discussion of current or future individual projects nor will it determine how funds are to be distributed among individual ongoing efforts.

Materials 2022: Primary Preliminary Recommendations

Matt Tirrell

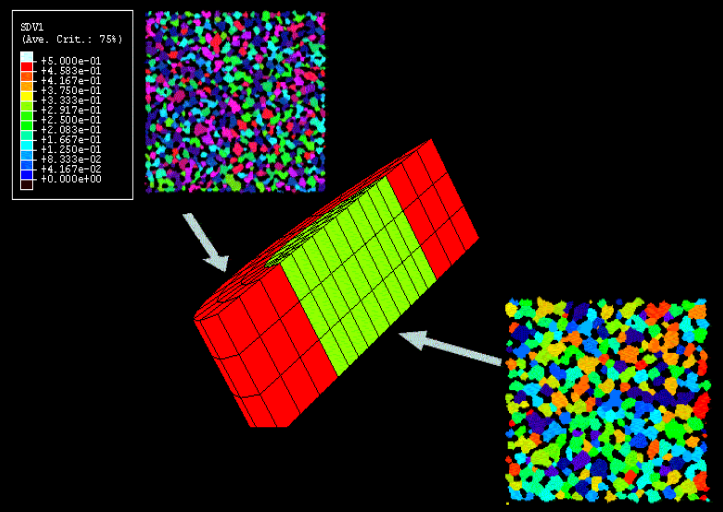
Roger Falcone

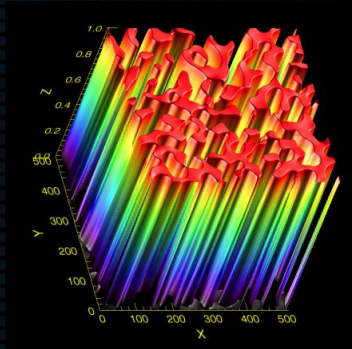
- Consider increased funding for MRI proposals and developing a mechanism for the acquisition and stewardship of equipment in the $100,000-$500,000.
- Recognize the critical role that professional staffing plays in the successful operation of instrumentation and characterization tools. Models/programs should be developed that allow for this impact to extent over the full DMR portfolio.
- DMR should consider a network of centers – that may focus on either the provision of a broad instrumentation portfolio to the external community or to fulfill a specific need/expertise (i.e. X-ray, microscopy, crystal growth). Critical features of such centers are a focus on professional staffing for training, user support, research and education.
- Continue to support acquisition and development of instrumentation at all scales (single-user, institutional, regional, and major facilities) including the development of the infrastructure for instrumentation networks (e.g. clouds), support for instrumentation access (travel costs, users fees), and student training and experience on shared instruments.

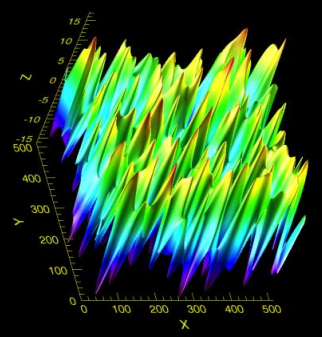
Infrastructure

Cyber-Infrastructure Framework for the 21st Century (CIF21)

- Necessary to ensure that simulations are able to capture the complexity of nature, and are physically correct, reproducible, and predictive
- Investing in MPS computational sciences, algorithm development, and software infrastructure needed for sustained long-term research efforts.
- Equal attention will be given to data-enabled science, including fundamental mathematical algorithms, software, data services, and network infrastructure







DMR: several choices:

1. Submit to sub-disciplinary programs
2. EAGER - **EArly-concept Grants for Exploratory Research**
3. DMREF
4. Supplements to current awards

Materials World Network

FY 13

Corresponding submissions to NSF and to national/regional funding agencies in partnering country

Parallel (most cases) or single joint review (UK, Germany)

DMR reviews proposals within programmatic areas

8-10 topical panels, include non-US panelists

NSF standard review criteria (intellectual merit and broader impacts) *and*

value added by international collaboration

balance of intellectual efforts in the US and abroad participation of junior researchers in international research experiences

Coordination with foreign funding agencies for joint identification of awards

NSF funds US institutions; organizations abroad fund their researchers

NSF supports all costs associated with the research in the US side (not just mobility)

57 Participating Countries FY08-12

Leverages NSF DMR investment in materials research

Expeditions in Education – E^2

E^2 activities will integrate STEM education research and development to improve learning in science and engineering disciplines and capitalize on the scientific assets across NSF to bring engaging new evidence-based practices, content, knowledge, and real-world applications to more learners.

New opportunity for the Materials Research community in the FY 13 Budget Request:

DMREF – Designing Materials to Revolutionize and Engineer our Future (Materials Genome Initiative activity at NSF)
Sustainability – going beyond science and engineering solutions. Introducing computation tools and methods into the undergraduate curriculum

NSF CAREER-LIFE Balance Initiative

MPS: Mathematical Sciences, Physics, Chemistry, Astronomy, Materials Research

- Number of women earning MPS doctoral degrees

Year	Number	% of total MPS degrees
2000	1366	23%
2008	2024	28.5%

- In 2008, women occupied 18% of tenured and 29% of tenure track
- 43% of women and 25% of men were 10 years or less from doctorate

Career-Life Balance MPS DCL-Community Update. NSF 12-015

FLEXIBILITY!

- no-cost extensions or temporary suspensions of NSF awards due to family leave
- flexible start dates for NSF awards
- supplements for additional personnel to sustain research when principal investigators are on family leave
- flexible postdoctoral fellowships to accommodate dual-career placements
- options for remote panel participation
- local child care recommendations for panelists
- instructions for panelists describing family-friendly practices.

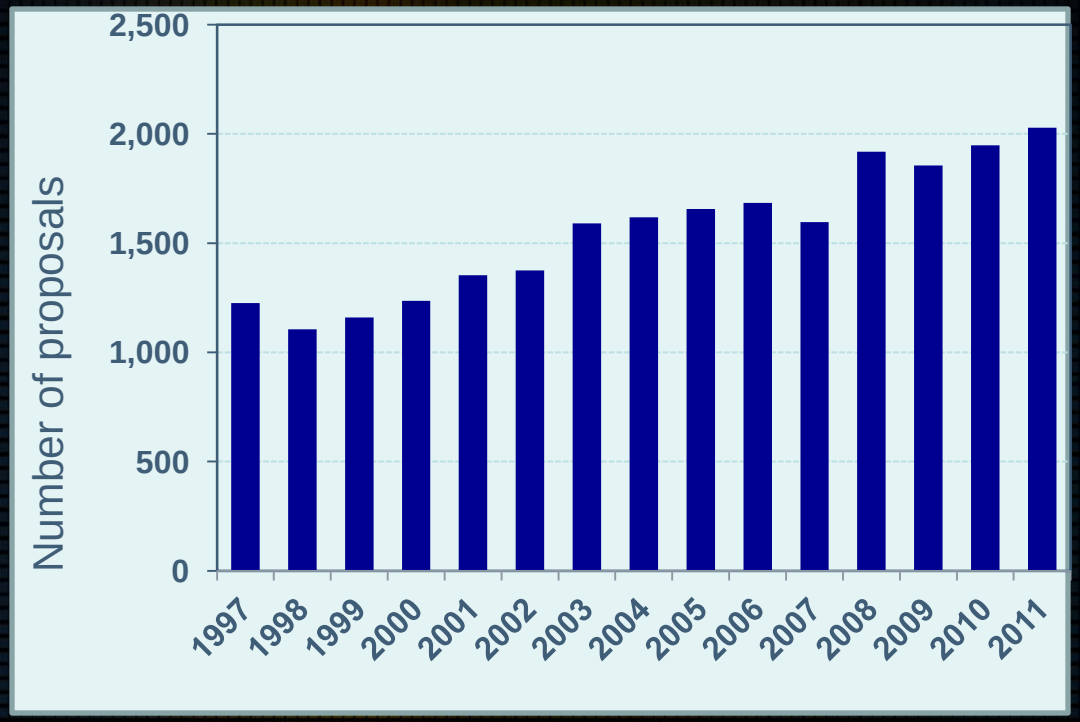
Year	Number	% of total MPS degrees
2000	1366	23%
2008	2024	28.5%

- In 2008, women occupied 18% of tenured and 29% of tenure track
- 43% of women and 25% of men were 10 years or less from doctorate

CONTACT YOUR PROGRAM OFFICER

Stewardship

DMR proposal pressure – internal and external impact



How you can help

- Convey the message to your faculty that one strong proposal has a better chance of success than flooding the system with proposals.
- Think carefully about resubmitting declined proposals. Ask what have you done beyond trying to directly address the comments of a few reviewers. This approach rarely leads to success.
- Consult with the relevant program director.

1. Before you start read the GPG! Follow the instructions on proposal preparation.
2. Any questions make sure to contact the cognizant program officer at the Foundation
3. Work with your sponsored research office to have your proposal submitted prior to the deadline.

Return Without Review

The proposal:

1. is inappropriate for funding by the National Science Foundation;
2. is submitted with insufficient lead-time before the activity is scheduled to begin;
3. is a full proposal that was submitted by a proposer that has received a “not invited” response to the submission of a preliminary proposal;
4. is a duplicate of, or substantially similar to, a proposal already under consideration by NSF from the same submitter;
5. does not meet NSF proposal preparation requirements, such as page limitations, formatting instructions, and electronic submission, as specified in the Grant Proposal Guide or program solicitation;
6. is not responsive to the GPG or program announcement/solicitation;
7. does not meet an announced proposal deadline date;
8. was previously reviewed and declined and has not been substantially revised; and
9. duplicates another proposal that was already awarded.

Proposals that do not separately address both merit review criteria within the one-page Project Summary will be returned without review.

Stewardship

How you can help:
Acknowledging your support from the Foundation

Support from the NSF must be appropriately acknowledged in all presentations and publications as well as web sites.

Reporting work supported by multiple agencies or programs within NSF is accepted but the contribution from each funding agency must be acknowledged appropriately.

Centers, institutes and facilities need to display the program name, for example “MRSEC” , should appear on websites, publications, and presentations. The “brand name” must be featured prominently.

We need your support to ensure NSF DMR activities receive appropriate recognition

Ongoing activities in 2012

Biomaterials Workshop





- June 19-20, 2012 at NSF headquarters
- Steering committee:
  - David Tirrell (chair), Caltech
  - Kristi Anseth, CU Boulder
  - Dennis Discher, UPenn
  - Lara Estroff, Cornell
  - Paula Hammond, MIT
- 60 invited participants
- Report expected by August 2012
- DMR will use workshop outcomes and report recommendations to identify critical areas of focus for the BMAT program

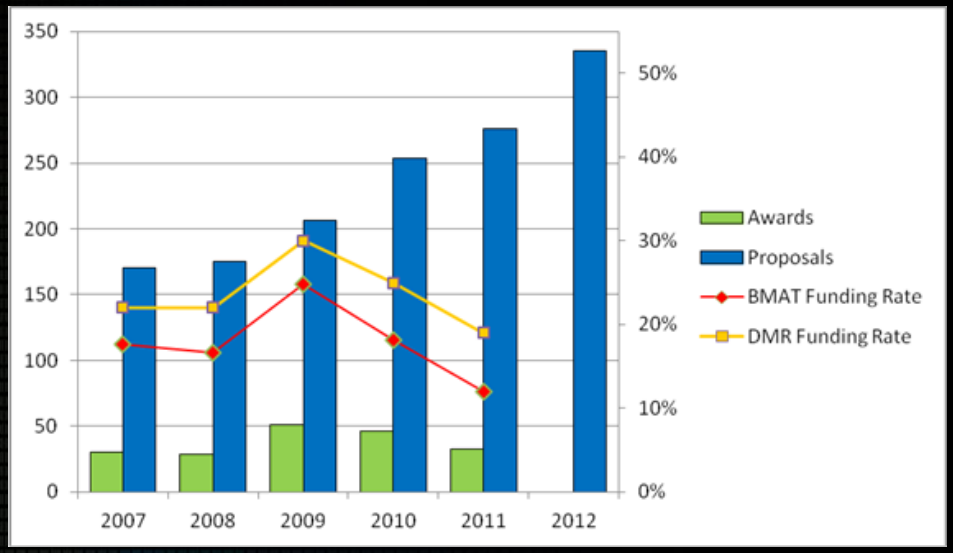
NSF Contacts:

- Ashley White, AAAS S&T Policy Fellow
- David Brant, Program Director

Biomaterials Workshop

Purpose: To help address growing proposal pressure and decreasing funding rate in the BMAT program

Statement of Task: To delineate the components of the biomaterials field and highlight critical areas and outstanding challenges that are ripe for investments in the next 5+ years



Number of BMAT proposals by year and funding rates.

Expected Outcomes:

- Provide a description of the biomaterials field that will help the community identify opportunities in this area
- Guide academia, industry, societies, public and private funders in directing resources towards most critical areas
- Promote discussions about how meeting these responsibilities will be partitioned among the various stakeholders
- Establish robust and durable lines of communication among the stakeholders that support work in biomaterials

CAREER Workshop

- Goals: Mentorship, strengthened sense of community, education about NSF
- Who:
  - CAREER awardees in years 4 and 5 (targeting those approaching time for their next grant)
  - DMR awardees, but possibly also CHE, CMMI, CBET and/or ECCS (these programs and the PIs have overlapping interests with DMR)
- Possible topics/sessions:
  - Funding opportunities and the NSF budget cycle
  - Grant writing beyond CAREER
  - Mentorship from senior faculty
  - Career-life balance

Emerging areas in metals research

The Metals and Metallic Nanostructures (MMN) Program is in the planning stages for a workshop to address emerging areas in metals research. The workshop is intended to:

- Summarize current research trends and recent breakthroughs
- Identify the most important emerging research areas
- Assess the roles of this field in relation to current national priorities (MGI, AMI, ICME, etc.); make pertinent recommendations
- Assess the position of domestic research efforts and capabilities relative to the international community; make pertinent recommendations
- Make recommendations to advance workforce development, particularly related to workforce diversity

The outcomes of this workshop will be used to define future directions and efforts in the MMN Program.

Eric Taleff

PI: Greg Rohrer, CMU

Emerging Topics / Grand Challenges: ceramics, inorganic carbon-based materials, glasses, and ceramic-based composites

International Leadership & Collaborations: incl. discussion of NSF opportunities, policies, practices, etc.

Emerging research areas:

1. **Understanding rare events:** *Extend lifetimes (Materials Sustainability)*
2. **Oxide electronics:** *Non-linear properties have potential to reveal phenomena not possible in conventional semiconductor electronics. (Focus: crystal growth, defects, integration)*
3. **Metastable defects in the vicinity of interfaces:** *Understand defects & interfaces, especially how defects apply to systems with small dimensions*
4. **Control of ceramics far from equilibrium:** *High surface areas: internal porosity, small particles, quasi 1-D (fibers) or 2-D (exfoliated layers) components. Predict differences from bulk equilibrium materials. Appreciate operational lifetimes.*
5. **Going beyond boundaries:** *New paradigm for understanding interfaces + computational & experimental tools provide unprecedented opportunities to explore composition & structure of boundaries & interfaces & to directly determine properties*
6. **Predicting Heterogeneous Microstructures Unprecedented Functionalities:** Challenge is to use these new capabilities to e.g., develop materials with ultrahigh temperature stability, high ionic conductivity at room temperature, & batteries that can charged in minutes & last hours
7. **Accelerated development of new ceramic materials:** *E.g., carbides, nitrides, oxycarbides, carbofluorides, … . Need computations, synthetic chemists…*
8. **Harnessing Order Within Disorder**: *e.g., improving strength of glass – untapped potential*

Planning stages of a “charrette” on heterogeneous data/long tail of science

- The charrette planning will build on the successful example of “EarthCube”
- Will be on data/cyber-infrastructure, useful to the disciplinary communities.
- The charrette will involve DMR, CHEM, BIO, OCI and CMMI. MPS will provide support and hire a contractor/facilitator.
- It should also involve both international partners and representatives from other federal agencies.
- We are thinking of an appropriate name and deciding how to make sure the various disciplinary communities are represented.
- Will probably happen sometime in the fall.

Workshop on Opportunities In Theoretical and Computational Soft Matter – Daryl Hess

- An outcome of CMMT discussions with polymeric materials and soft matter sectors of the community.

- Advances in theory and simulation have opened new vistas. The time is ripe to assess research directions that have opened for scientists working on theoretical and computational polymeric materials and soft matter. Specific questions that will be addressed include:
  1. What are grand challenge problems? What is needed to make progress?
  2. What are the emerging scientific opportunities that define theoretical and computational frontiers in this area of research?
  3. What opportunities lie at the interfaces with other research areas, such as biology, energy storage and conversion, and materials engineering?
  4. How can the community address problems of interest to industry?
  5. How will the next generation of scientists be trained to work effectively at this frontier and its interfaces?
  6. What opportunities does MGI bring to advance the field?

- The workshop is expected to be held in the October-November time frame and to produce an authoritative report.

Workshop on Opportunities Enabled by the Materials Innovation Infrastructure - Daryl Hess.

A workshop is being organized with a focus to advise DMR on how computation, experiment, and theory can interact synergistically to speed the discovery of new materials.

A steering committee has been formed. More information as planning progresses.

Diversity workshop

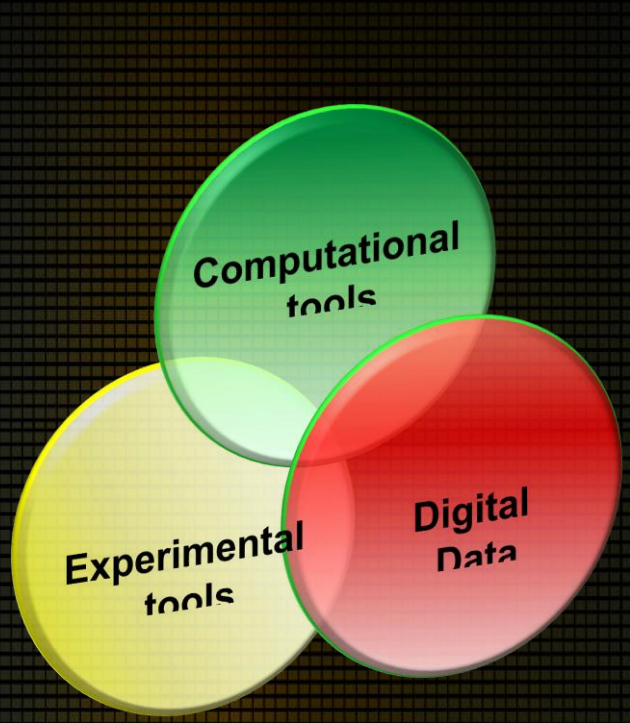
- Understanding and addressing the challenges of increasing the number from under-represented groups pursuing and staying in materials science and engineering

DMR Mission

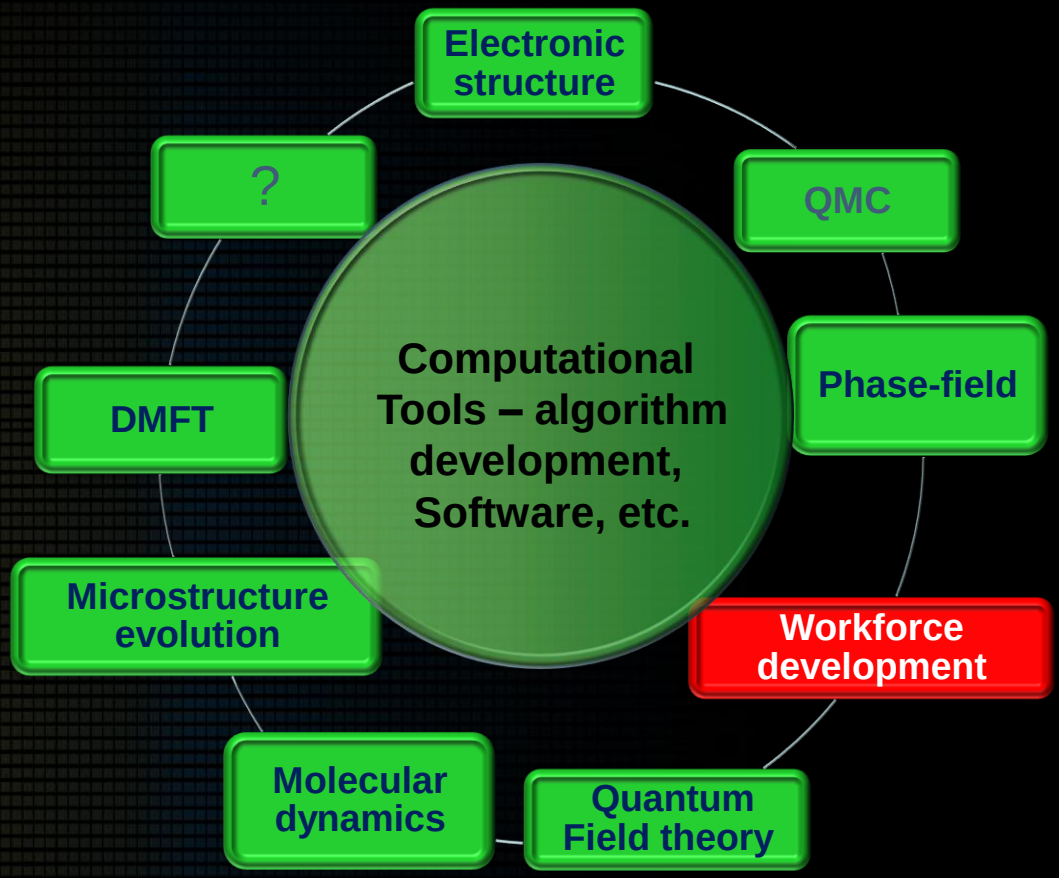
1. **Discovery**
2. **Interdisciplinary**
3. **Innovation**
4. **Education and Public Outreach**
5. **Infrastructure**
6. **Stewardship**

QUESTIONS?

Computational tools

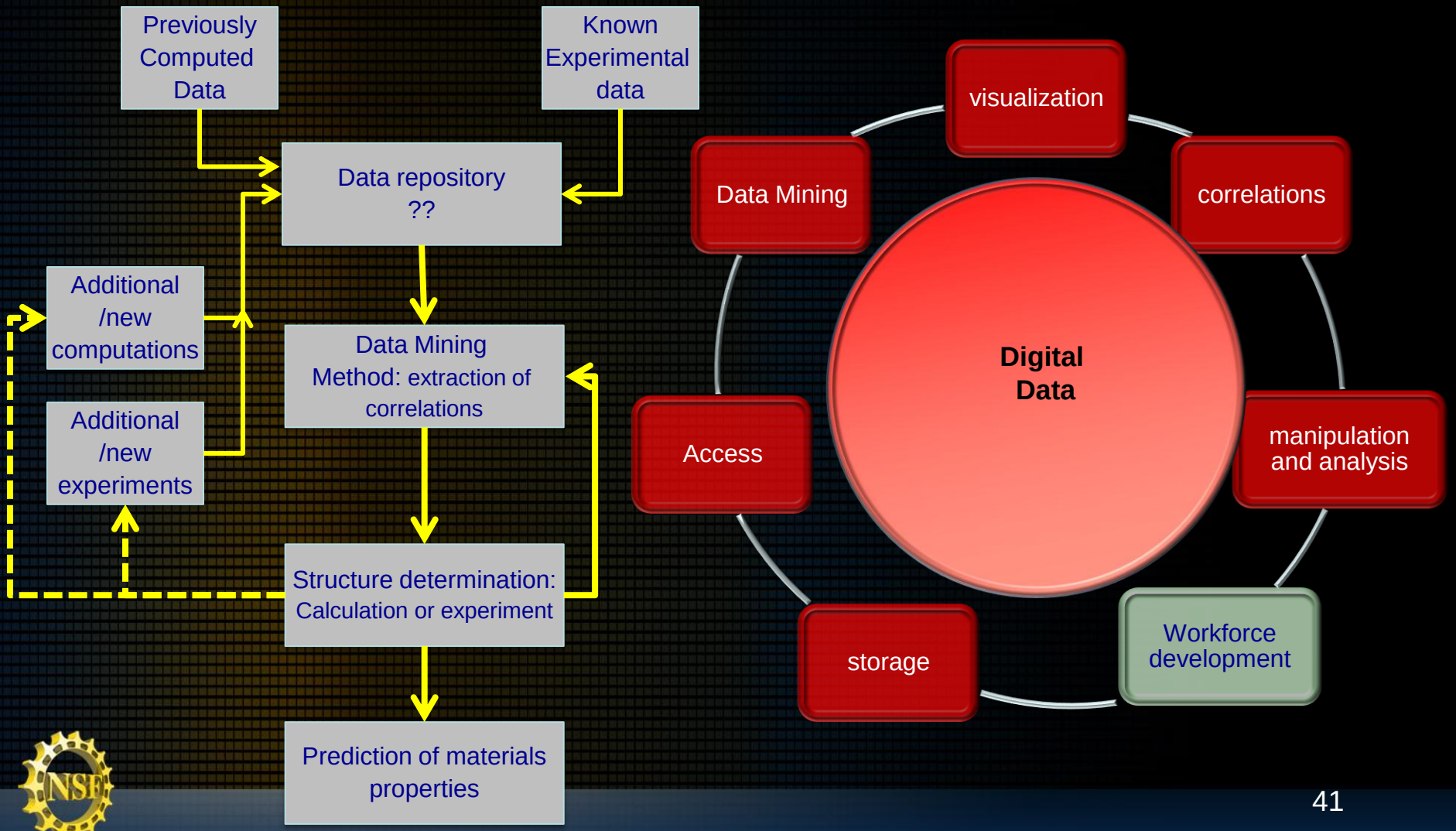


Materials Innovation Infrastructure



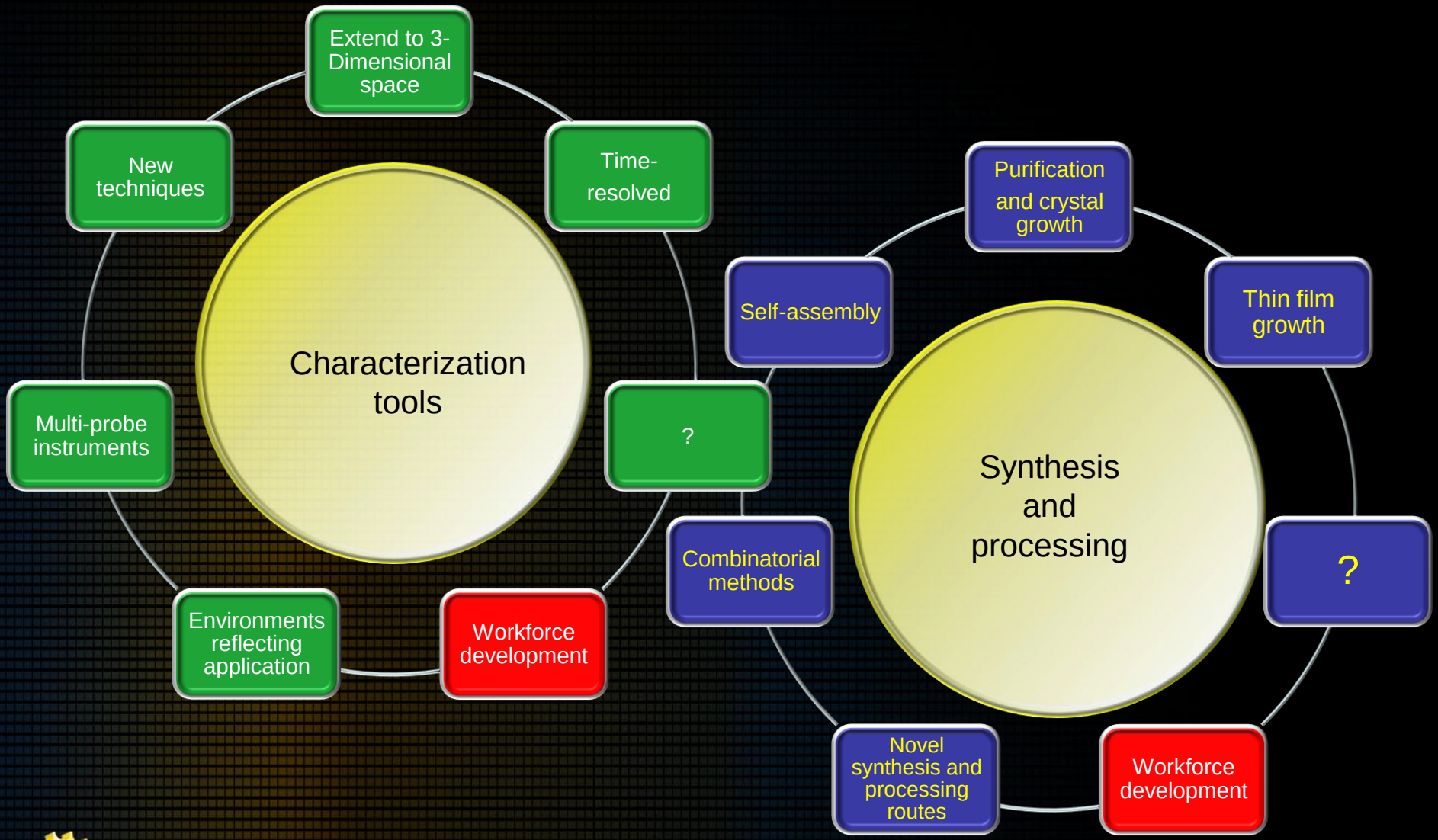
Discovery

Digital data for accelerated discovery of new materials and phenomena – new paradigms?



Adapted from Ceder and Morgan

Experimental tools



Division of Materials Research Mission

1. **Discovery**
2. **Interdisciplinarity**
3. **Innovation**
4. **Education and Public Outreach**
5. **Infrastructure**
6. **Stewardship**

Discovery

Spin Liquid in a realistic system (UC Irvine)

Nanoscale Assembly by Algorithmic Design (U. Penn)

Extended Spin Lifetimes in Bilayer Graphene (UC Riverside)

Biodesigning Advanced Nanocomposites (Northwestern)

Topological Insulators (Princeton)

Very Large Magnetoresistance in Graphene Nanoribbons for High Performance Electronics UCLA

Electrically- and Optically-Controlled Self-Assembly in Liquid Crystals (Colorado)

OPTICALLY HEALABLE MATERIALS (Case Western)

Quantum Transport in High Mobility Graphene (MIT)

Plasmonic Dye Sensitized Solar Cells (Cornell)

Single-Chirality Single-Walled Carbon Nanotubes (Northwestern)

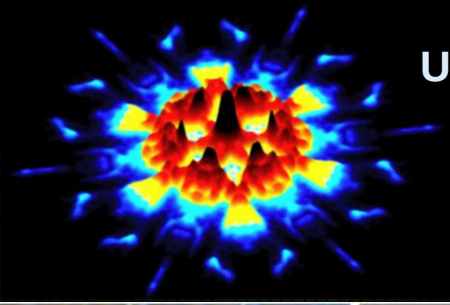
Highly complex 3-D nano-objects by DNA origami (Arizona State)

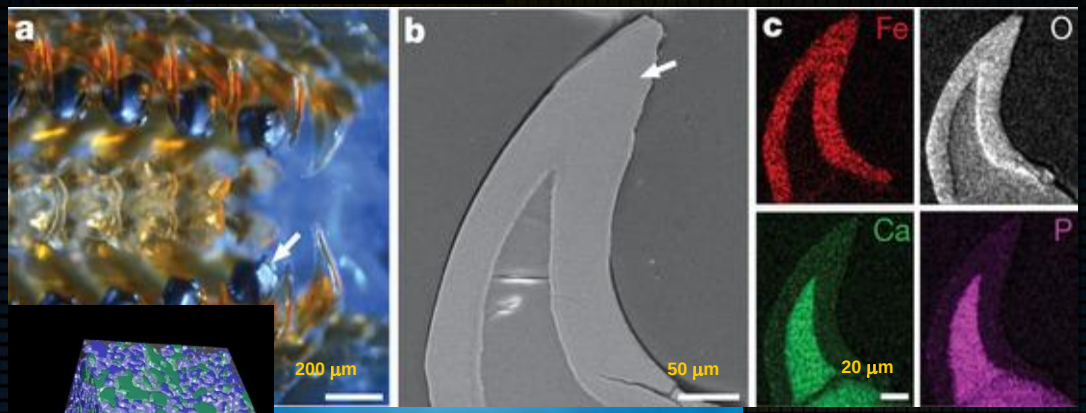
Experimental Investigation of Plasticity at Nanoscale (Cal Tech)

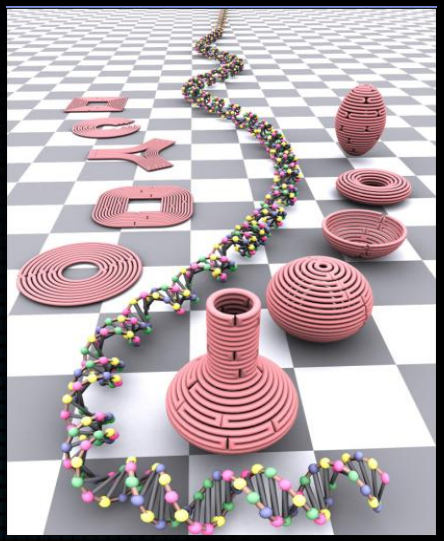
Self-assembly on elastic surfaces (Columbia)

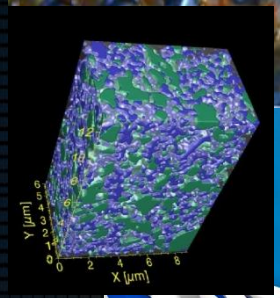
Where Discovery begins

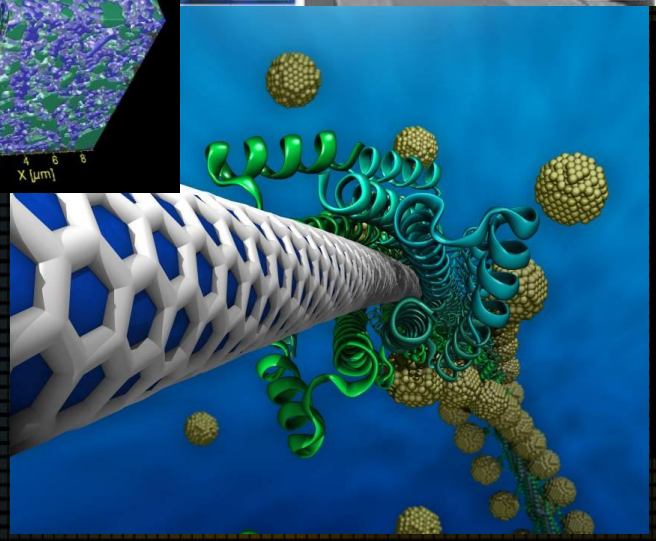
U.S. National Science Foundation: Division of Materials Research

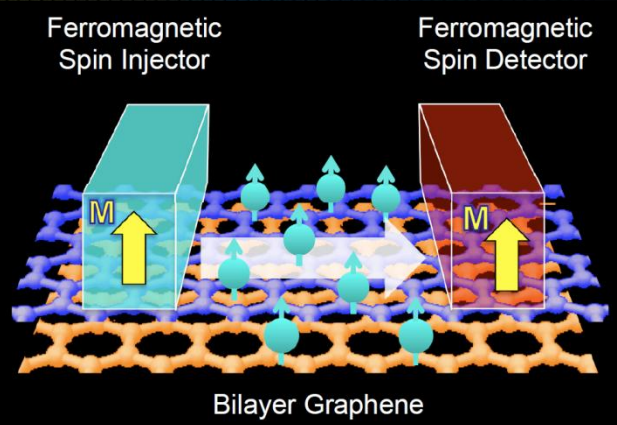


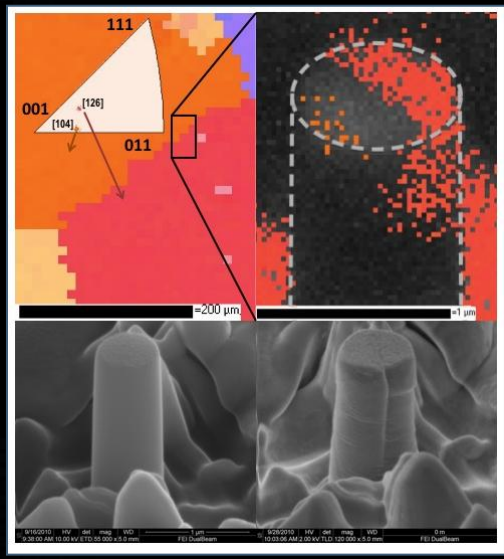


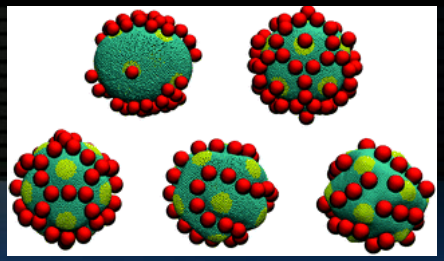












Infrastructure

National High Magnetic Field Laboratory: Florida State U., U. Florida, Los Alamos

MAGNETS:

- 100.7 T non-destructive pulsed field magnet – world record
- 45 T DC hybrid – highest steady magnetic field in the world
- Split coil 25 T magnet
- 900 Mhz MRI – world's strongest MRI machine
- 21 T Ion Cyclotron Resonance Spectrometer under construction – highest field ICR in the world

USER Programs: https://users.magnet.fsu.edu/

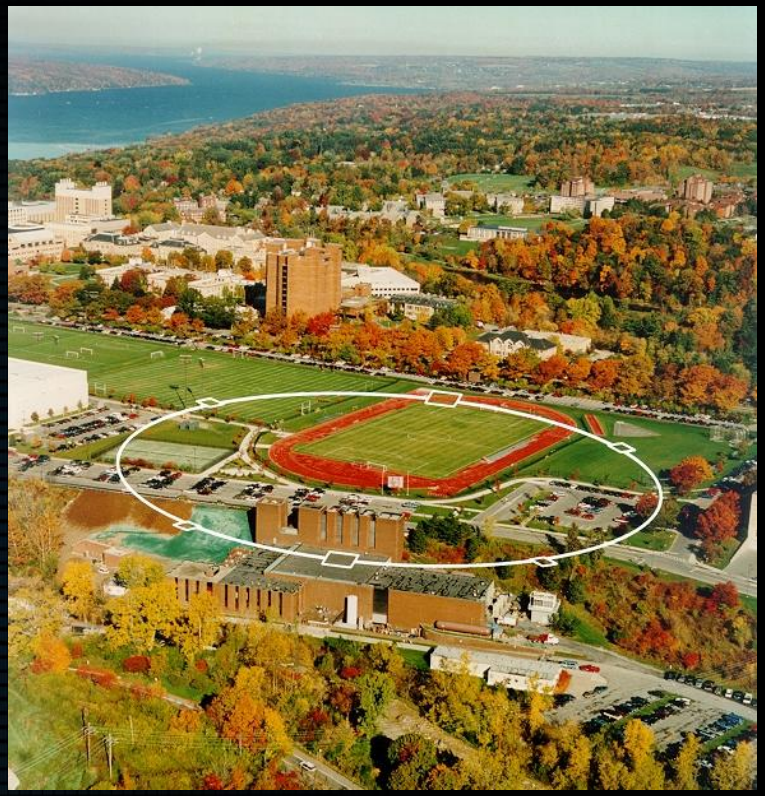
- Advanced Magnetic Resonance Imaging and Spectroscopy
- DC Field
- Electron Magnetic Resonance
- High B/T (magnetic field/temperature)
- Ion Cyclotron Resonance
- Nuclear Magnetic Resonance
- Pulsed Field

Infrastructure

Cornell High Energy Synchrotron Source
Cornell University

11 HIGH ENERGY X-RAY BEAMLINES:

- National High Pressure Facility: High pressure cell allows exploration of utilizing pressure to induce metastable states and studies of nucleation processes.
- Real time observation of materials synthesis discovery of new materials phases and optimization of synthesis conditions. EXAFS, SAXS, fluorescence spectroscopy (including micro-science utilizing focusing capillary optics), single crystal diffraction, scattering experiments using extremely small specimens, and instrumentation development.
- Understand the details of how enzymes work and to be able to mutate, or even *ab initio* predict and synthesize enzymes that catalyze. (2 Nobel Prizes)



To apply for beam time:
http://www.chess.cornell.edu/prposals/index.htm

Infrastructure

Center For High Resolution Neutron Scattering (CHRNS)

National Institute of Standards and Technology

http://www.ncnr.nist.gov/proposal.html

- 30 m high resolution, small-angle neutron scattering instrument
- Diffractometer for ultra-high-resolution small angle scattering
- Cold neutron, triple axis neutron scattering spectrometer
- Multi axis crystal spectrometer
- Very flexible cold-neutron time-of-flight spectrometer
- Backscattering spectrometer with 1 micro eV resolution
- Neutron spin echo spectrometer

National Nanotechnology Infrastructure Network

14 Sites: www.nnin.org

Nanocontacts, quantum dots, break junctions, Superconduction nanostructures;advanced silicon Device structure, process integrations,microwave and mm WaveDevices, gratings couplers,waveguides,lasers, Detectors, photonic crystals, semiconductor LEDs Materials,biocompatible surfaces,sensors,actuators Lab on a chip,nanophase materials,catalysts,self - assembled films

Infrastructure

Major Research Instrumentation Acquisition and Development :

Electron Microscopes
X-ray Diffractometers
X-ray Photoelectron Spectroscopy
X-ray Fluorescence
Ultrafast Lasers
Atomic force microscopes
Surface Plasmon Resonance
Electron beam lithography
Cryo-systems for magnets, etc.
And many others…

http://www.nsf.gov/od/oia/programs/mri/

International Materials Institutes

FY 13

(total program $20M over 5 yrs)

University of California
Santa Barbara
www.icmr.ucsb.edu

Texas A & M
www.iimec.tamu.edu

University of California
Davis
www.i2cam.org

Lehigh University
www.lehigh.edu

Northwestern
University
www.imisee.edu

Extends to ~40 countries and leverages ~$40 M of foreign funding.
These started in 2009.

Stewardship

How you can help. Consider a “Rotation” as a Program Director or as an Executive at the National Science Foundation

- Manage the proposal review process.
- Interact with potential principal investigators.
- Recommend funding decisions.
- Manage post-award activities.
- Collaborate and interact with members of your specific scientific communities.
- Organize/inspire workshops, conferences, and forums.
- Help identify areas of potentially transformative research.
- Liaise with research or research education communities.
- Build new national and international collaborations.
- Play an important role in broadening participation of underrepresented groups in the science and engineering community and the implementation of family friendly policies.
- Create new cross-disciplinary and cross-agency partnerships. Influence new directions in the fields of science, engineering, and education.
- Support cutting-edge interdisciplinary research.
- Mentor future leaders in science and engineering.

- Executives influence the budgets and programs, all hiring in the Divisions, and represent the NSF and the US in all interests in your disciplinary area.

We know many potential candidates have ongoing NSF grants. NSF has mechanisms in place that allow active researchers and educators to continue functioning at their home institution while at NSF on temporary assignment serving the scientific community.

SEND A CV TO THE DIVISION DIRECTOR, see http://www.nsf.gov/about/career_opps/rotators/index.jsp#