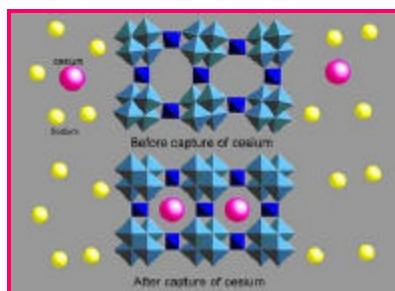
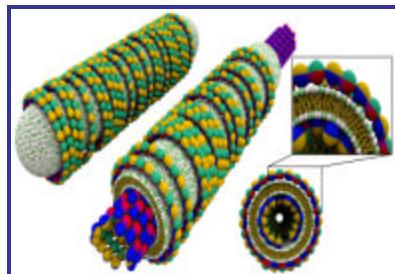


# Materials Research & Education in DMR: Looking Back, Racing Forward

Zakya H. Kafafi

Director, Division of Materials Research (DMR)



# FY 2009 Budget Request by Division

## Mathematical and Physical Sciences Funding

(Dollars in Millions)

	FY 2007	FY 2008	FY 2009	Change over					
				Actual	Estimated	Request	FY 2008 Estimated	Amount	Percent
Astronomical Sciences	\$215.39	\$217.86	\$250.01			\$32.15			14.8%
Chemistry	191.22	194.22	244.67			50.45			26.0%
Materials Research	257.27	260.22	324.59			64.37			24.7%
Mathematical Sciences	205.74	211.79	245.70			33.91			16.0%
Physics	248.47	250.52	297.70			47.18			18.8%
Multidisciplinary Activities	32.64	32.70	40.00			7.30			22.3%
<b>Total, MPS</b>	<b>\$1,150.73</b>	<b>\$1,167.31</b>	<b>\$1,402.67</b>			<b>\$235.36</b>			<b>20.2%</b>

Totals may not add due to rounding.

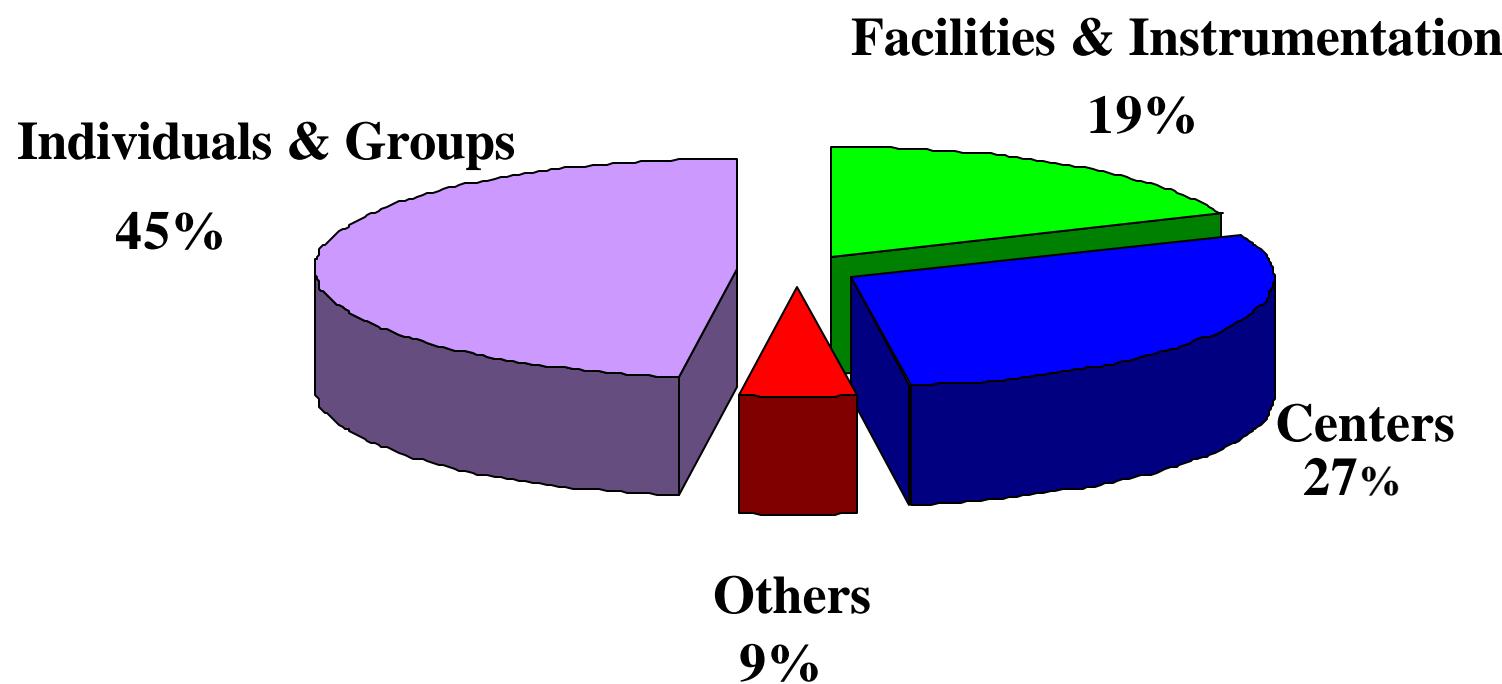
NSF:  
\$6.854 B,  
+13.0%

# Racing Forward

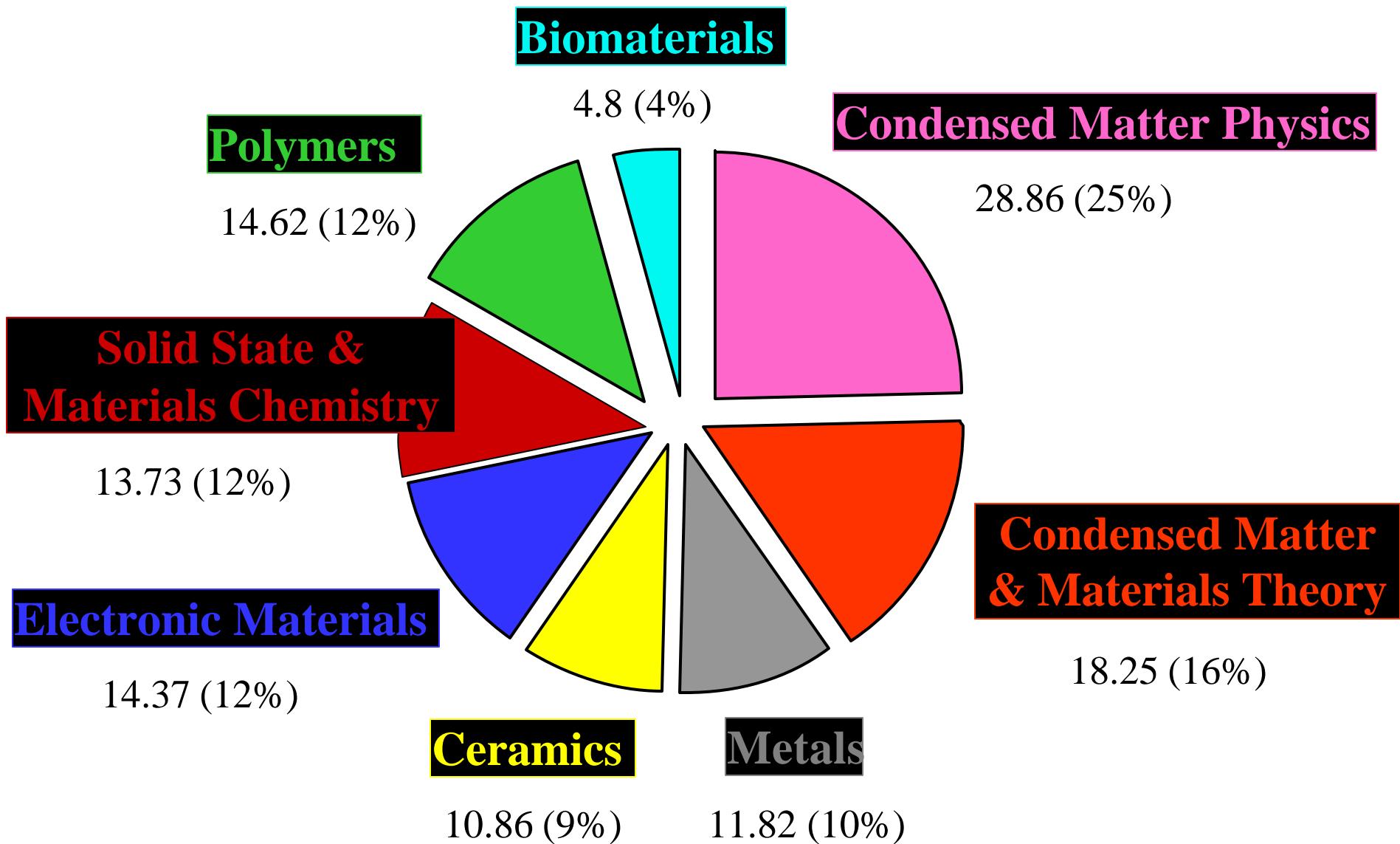
## **Substantial increase in budget will allow DMR to:**

- Increase # and size of PI grants
- Start new centers & institutes to enable focus on transformative, interdisciplinary, global research & education effort
- Expand investments in workforce development, especially at the junior rank while broadening participation for women, minorities and scientists with disabilities
- Develop new educational & outreach activities

# DMR Support in Materials Research & Education (\$257 M in Fiscal Year 2007)



# Funding (\$M) Distribution for Individual Investigators' Programs in Fiscal Year 2007



# MPS by Division

(Dollars in Millions)

**FY 2005 - FY 2008**

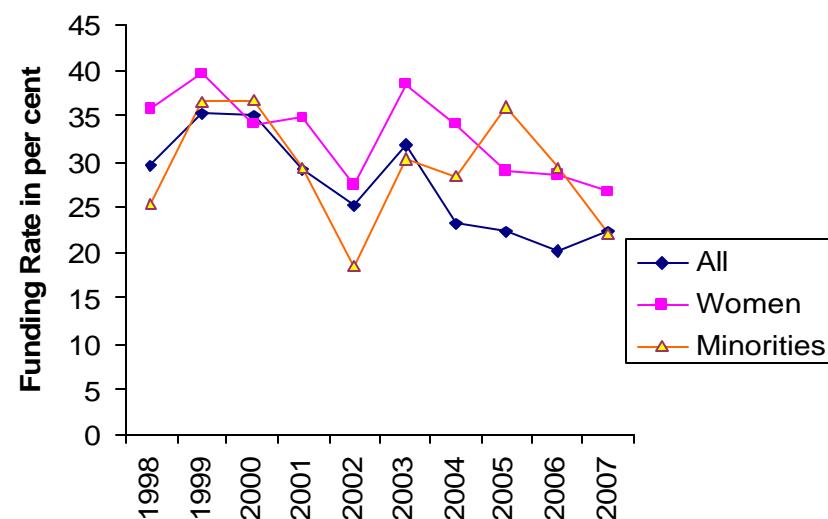
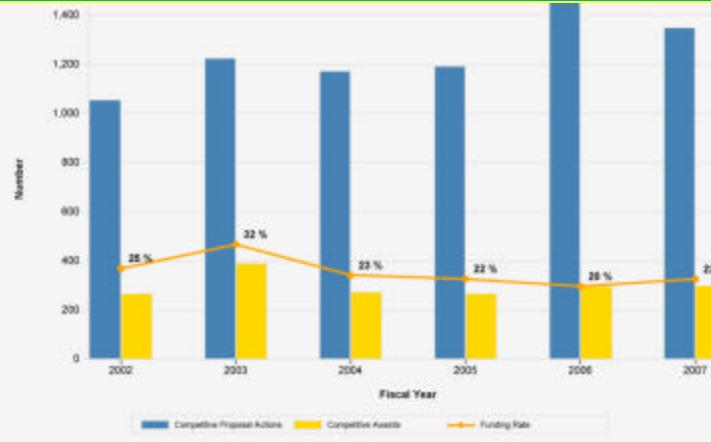
	FY 2005	FY 2006	FY 2007	Change from 06 to 07	FY 2008	Change from 07 to 08	Change	
	Actuals	Actuals	Actuals		Request		FY 2008	from 07 to 08
AST	195.11	\$199.75	\$215.39	7.8%	\$232.97	8.2%	\$217.86	1.1%
CHE	179.26	180.70	191.22	5.8%	210.54	10.1%	194.22	1.6%
DMR	240.09	242.59	257.26	6.0%	282.59	9.8%	260.22	1.2%
DMS	200.24	199.52	205.74	3.1%	223.47	8.6%	211.79	2.9%
PHY	224.86	234.15	248.47	6.1%	269.06	8.3%	250.52	0.8%
OMA	29.80	29.90	32.64	9.2%	34.37	5.3%	32.70	0.2%
<b>MPS</b>	<b>1,069.36</b>	<b>1,086.61</b>	<b>1,150.72</b>	<b>5.9%</b>	<b>1,253.00</b>	<b>8.9%</b>	<b>\$1,167.31</b>	<b>1.4%</b>

# Impact of FY2008 Budget on DMR Programs

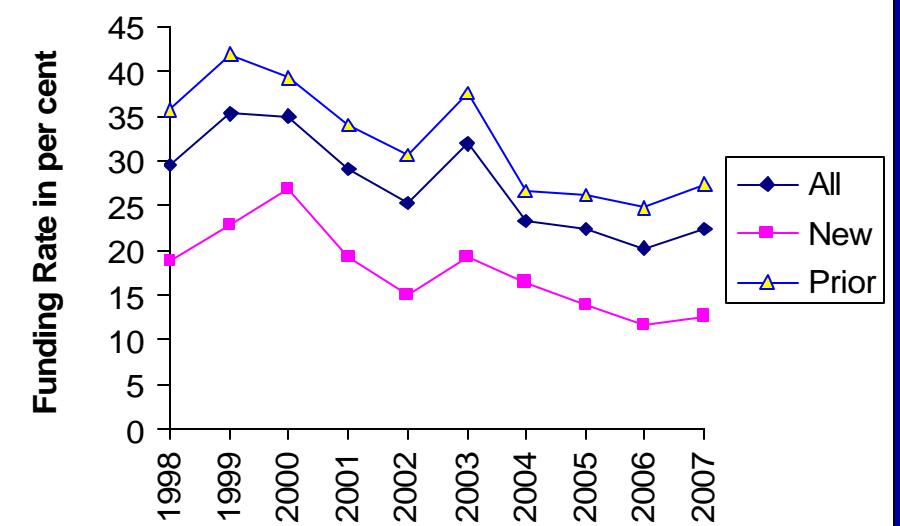
- DMR will be **unable** to increase research and education support
- Success rates for individual investigators will remain at historically low levels
- DMR will be **unable** to increase support for centers
- DMR will be **unable** to enhance research, user programs, instrument upgrades or education activities at the National High Magnetic Field Laboratory

# DMR Funding Rate for Research Proposals

## Total Number of Proposals & Awards in FY 2002- FY 2007

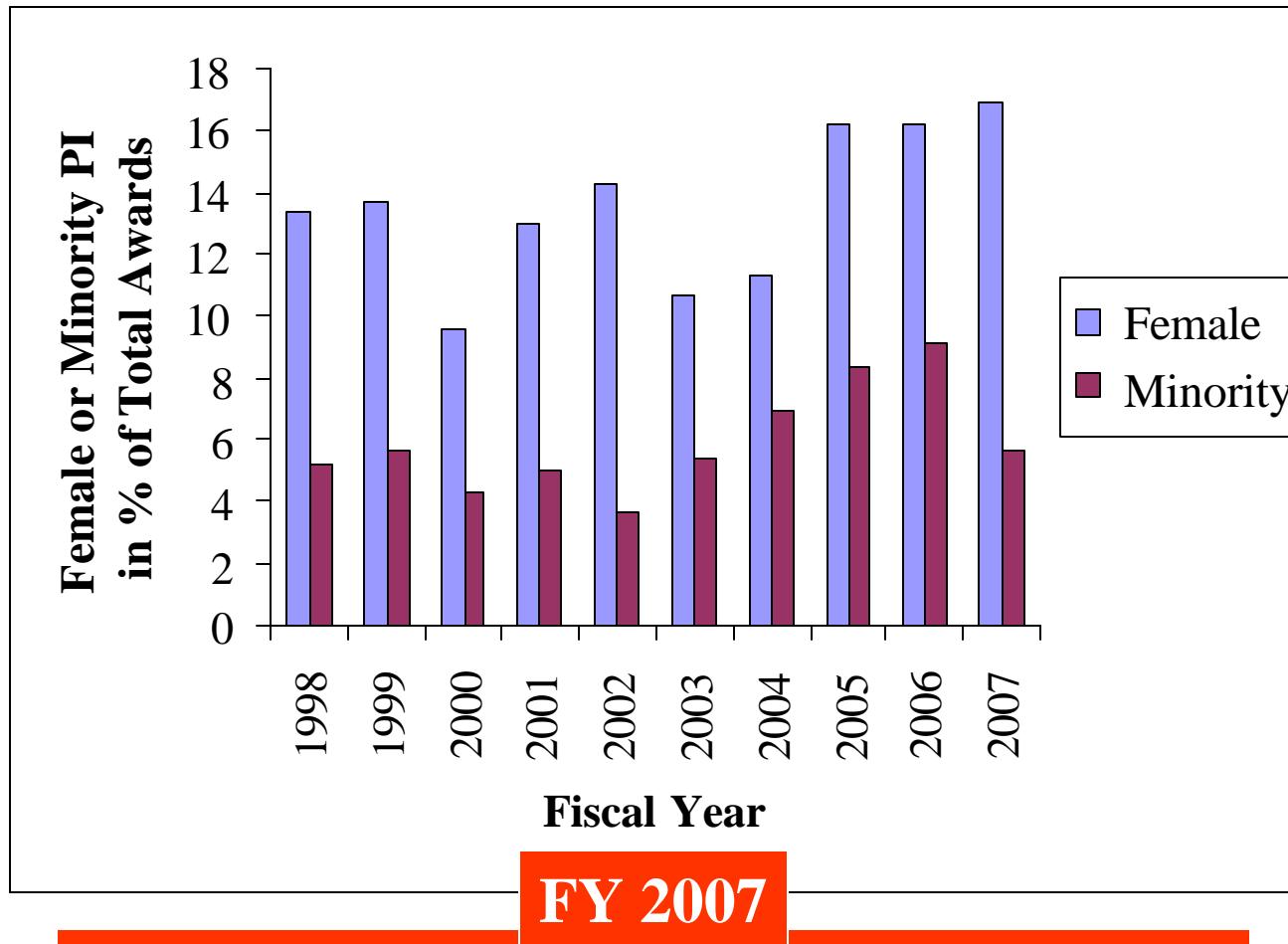


Women or Minority Principal Investigators



New versus Prior Principal Investigators

# DMR Awards Demographics in FY 1998 – FY 2007



**FY 2007**

Total number : 1,352 proposals / 301 awards

Women PIs : 191 proposals / 51 awards

Minority PIs : 77 proposals / 17 awards



# NAS Studies & NSF Workshops

## National Academy of Sciences (NAS)

- Condensed-Matter and Materials Physics (2007)
- Materials Research, Science & Engineering Centers (2007)

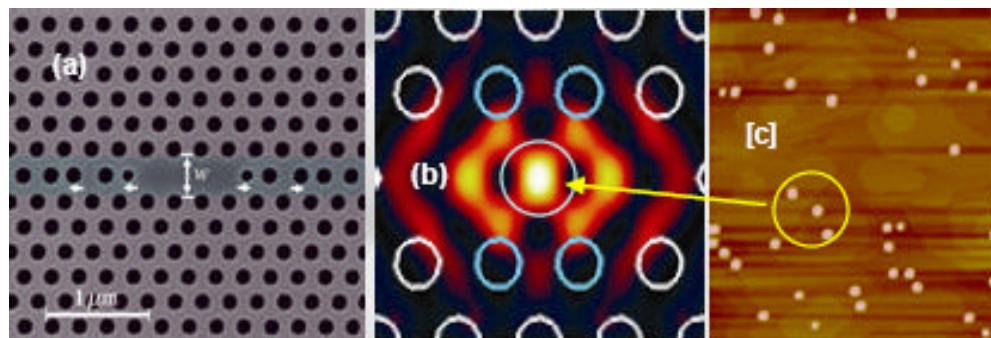
## National Science Foundation (NSF)

- Future Directions in Solid-State Chemistry (2008)
- Interdisciplinary, Globally Leading, Polymer Science & Engineering (2008)



# Physics 2010 – Big Questions

- **How do complex phenomena emerge from simple ingredients?**
- **How will the energy demands of future generations be met?**
- **What is the physics of life?**
- **What happens far from equilibrium and why?**
- **What new discoveries await us in the nanoworld?**
- **How will the information technology revolution be extended?**
- **How do we extend the frontiers of measurement & prediction?**
- **How can we inspire and teach others?**



Quantum-dot photonic crystal cavity  
Evelyn Hu et al., UCSB



# DMR Vision for 2010 and Beyond

- Sustainability
- Matter by Design
- Diversity
- International Activities
- Cyber-Enabled Discovery
- Quantum Science & Engineering
- Emergent Behavior
- Observation & Imaging
- MPS Life Science Interface
- Plasma Science & Engineering
- Education

## Pilot ACI-Fellows Program in 2008

- Creativity extension awards for young investigators and under-represented groups
- High-risk, transformative research & education with emphasis on broadening participation

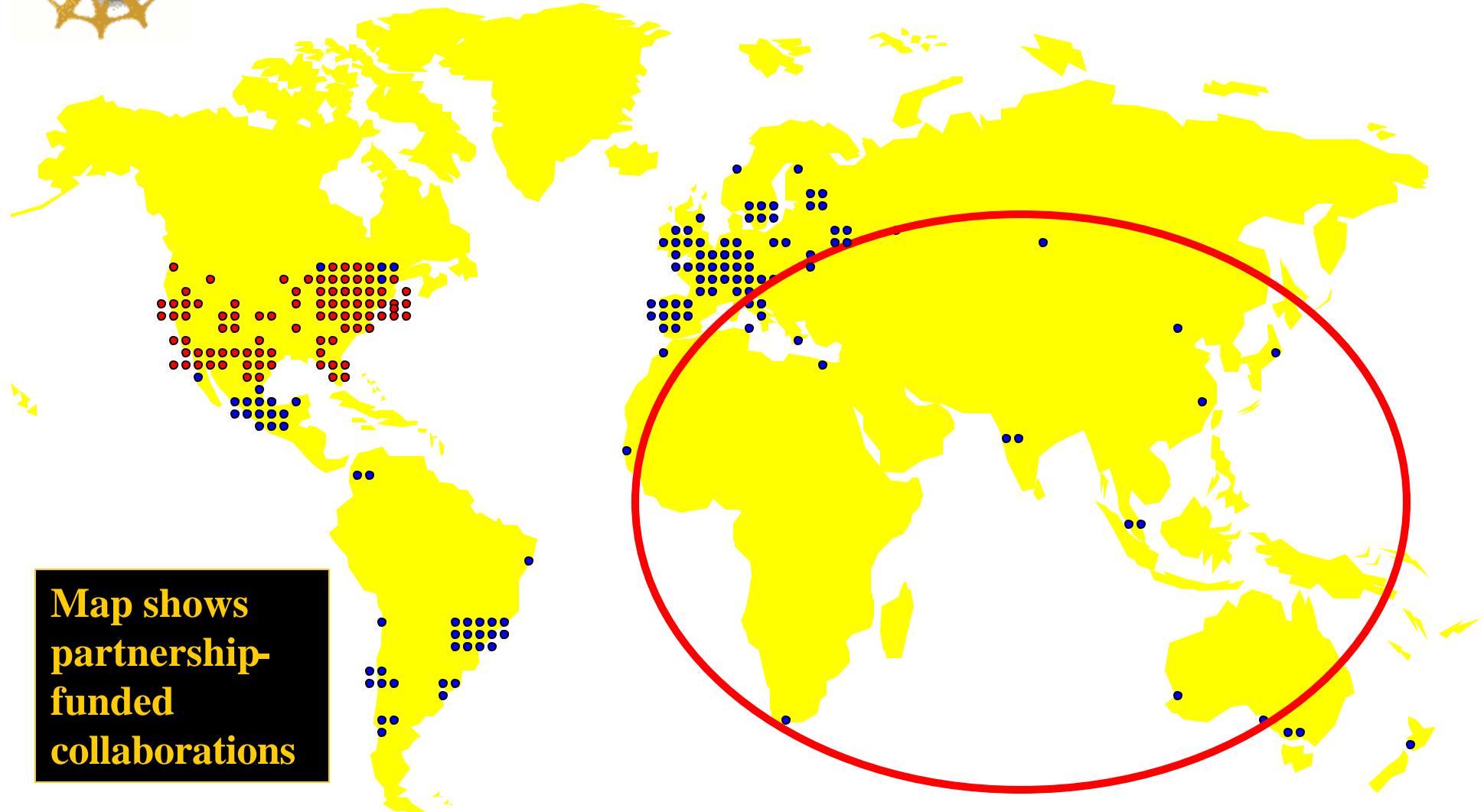
## Diversity & Education Workshops in 2008

- Gender Equity Workshop (May 18-20, U. of Maryland)
- Education Workshop (August 4-5, NSF)
- Workshop for Scientists with Disabilities



# The Materials World Network - 2007

Since 2001 ~950 NSF proposals, 182 awards, \$67M



The International Materials Institutes are developing  
collaborations within Asia and Africa...



# Asia Participation in the Materials World Network

## Current Participation

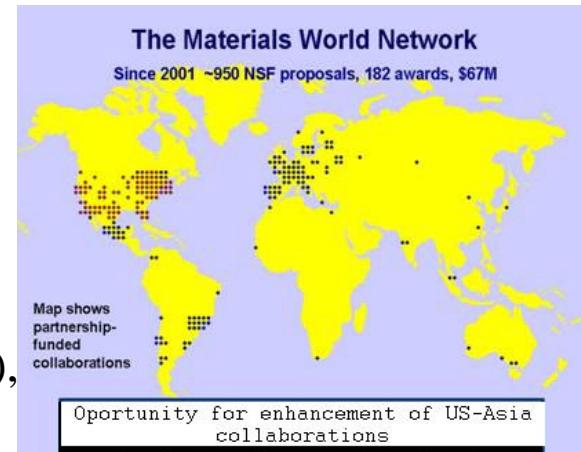
Natural Sciences Foundation-China (NSFC), China

Department of Science and Technology (DST), India

Japan Society for the Promotion of Science (JSPS), Japan

Agency for Science, Technology, and Research (A\*STAR),

National Science Council, Taiwan



## DMR Visit to China & Japan (10/22-11/2/2007)

- ✓ Expanded participation of NSF-China beyond 'materials science' to include condensed matter physics and polymer science
- ✓ Future yearly NSF-NSFC joint workshops alternating between USA and China

**"Nanostructured Materials for Global Energy and Environmental Challenges" jointly with CHE & DMS will be held in USA**

- ✓ Possible joint summer school with Ministry of Science and Technology (MOST), China
- ✓ Incorporated the participation the following organizations in Japan in the MWN:
  - \* National Institute of Materials Science (NIMS)
  - \* New Energy Development Organization (NEDO)
  - \* Japan Science and Technology Agency (JST)

# Emerging & Future Developments in MRSECs

## **MRFN: Materials Research Facilities Network is up and running:** <http://mrsec.org/facilities/>

- Started with four coordinating nodes, fifth node was added last year
- Expected to grow from now on
- Remote control experiments and access to equipment

## **TRIM: Transformative Research in Materials**

- Mid-term super-seed competition

## **MRSEC Directors web site** <http://www.MRSEC.org>

- Redesign, new functionality, new web master hired; work closely with PDs
- Develop a true network linkage between all present & future MRSECs

## **Education and Outreach Network is under development**

- Collaboration with Digital Library Project, NRCEN etc,
- Regular Education Coordinators meetings at MRS, APS etc
- MRSEC Education Coordinators, L. Bartolo&Co, I. Zaks

## **PREM: 10 awards all with MRSECs**

- Clear benefits, Goals, Centralized coordination, Recent Workshop
- The program will be expanded to include women colleges, students with disabilities, etc..

## **MRG: Material Research Group**

- **Program will be launched in FY2010**
- Competitions will be coordinated with the MRSEC cycles

## **CDI enabled: National & international centers and research groups without boundaries**

- Possible co-funding with other agencies: DoE, DoD, NIH, and industry



# DMR Facilities – Major Challenges

*Facility operating costs are borne by DMR*

## I. Stewardship of the NHMFL

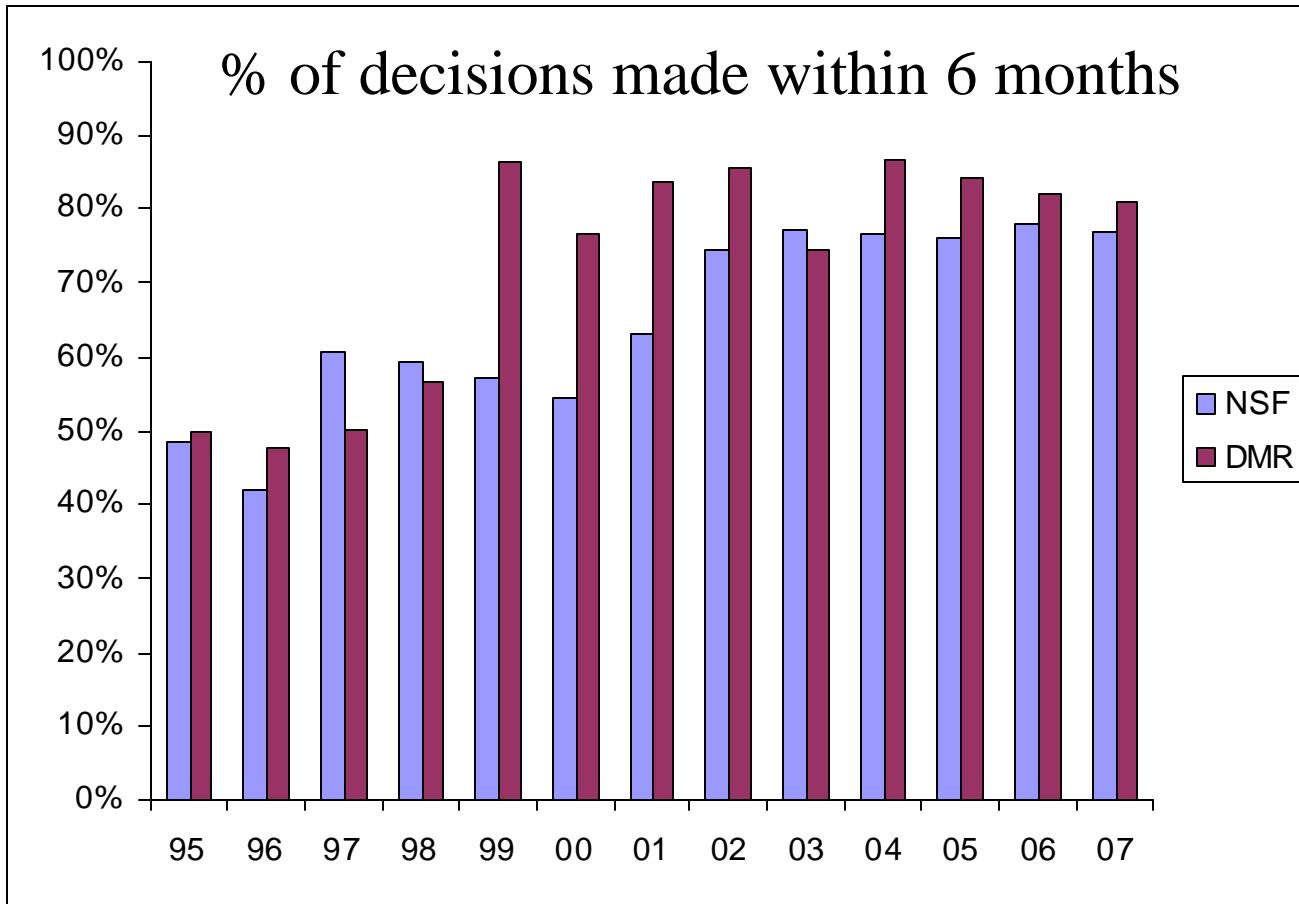
- DMR currently provides ~95% of NSF funding
- Serving an increasingly broad user community

**Partnership is essential !**

## II. Stewardship of Future Light Source Facility? Future of University-Based Synchrotron Facility?

*A major decision will be made based on the recommendations of the MPSAC panel on NSF role in future light source facilities!*

# Organizational Excellence



- We are doing better than NSF average
- We promise to increase it close to 90% !
- In fact some of the DMR programs have already reached this goal!