

Progress towards Implementation of recommendations on NNI at NSF

M.C. Roco

National Science Foundation and National Nanotechnology Initiative

PCAST Meeting on November 2, 2011, Washington, D.C.

NNI “signature initiatives” at NSF

Sustainable Nanomanufacturing

FY 2011: Program solicitation \$11.3M + core programs

FY 2012: Request \$57.2M

Nanoelectronics for 2020 and Beyond

FY 2011: Program solicitation with SRC \$20M + Core

FY 2012: Request \$50M

Nanotechnology for Solar Energy

FY 2011: Program solicitations, one with DOE + Core

FY 2012: Request \$32M



work

Its core: Four Nanomanufacturing

NSECs

- Center for Hierarchical Manufacturing
Mass Amherst/ UPR/ MHC/Binghamton
- Center for High-Rate Nanomanufacturing
Northeastern/ U. Mass Lowell/UNH
- Center for Scalable and Integrated Nanomanufacturing
UC Berkeley/ UCLA/ UCSD/ Stanford/ UNC Charlotte
- Center for Nanoscale Chemical-Electrical-Mechanical
Manufacturing Systems
UIUC/ CalTech/ NC A&T



CHM

Center for Hierarchical Manufacturing
University of Massachusetts Amherst



Center for High-rate
Nanomanufacturing



Collaborations with: NIST, DOE labs, NIH, other agencies,
industry and international organizations



Open-access network

www.nanomanufacturing.org

beta.internano.org

2001-
2012

NSF – discovery, innovation and education in Nanoscale Science and Engineering (NSE)

FY 2012 Budget Request \$455.9M (~ 5,000 projects; >25 centers, >10,000 students)

Fiscal Year	NSF	MANU	% at NSF	% at NNI	
2000	\$97M				
2001	\$150M				
2002	\$199M				
2003	\$221M				
2004	\$254M				
2005	\$338M				
2006	\$344M				
2007	\$373M				
2008	\$389M	\$20.7M	5.50%	3.00%	
2009	\$397M	\$21.9M	5.50%	3.80%	(\$505M with ARRA)
2010	\$428.7M	\$21.4M	5.00%	4.40%	
CP 2011	\$412.1M	\$22.4M	5.40%	3.80%	
Request 2012	\$455.9M	\$57.2M	12.60%	5.80%	



Nanoelectronics Research Initiative Funded Universities (SIA, NSF, NIST)



★ Notre Dame
Penn State

Purdue
UT-Dallas



★ SUNY-Albany
Purdue
Harvard
NCSU

MIT
GIT

Columbia
U. Virginia



❖ Awards made in 2011 for collaborative group research (NRI Signature Initiative)

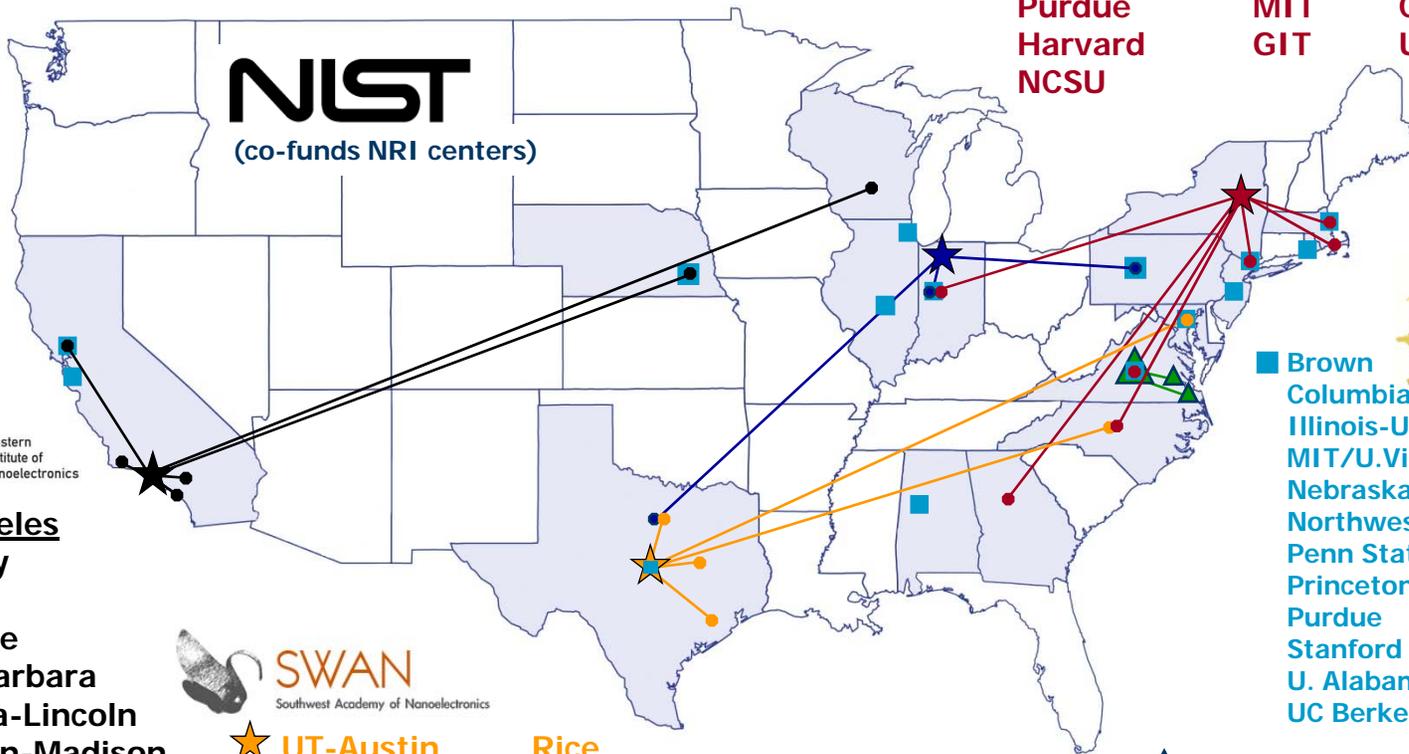


★ UC Los Angeles
UC Berkeley
UC Irvine
UC Riverside
UC Santa Barbara
U. Nebraska-Lincoln
U. Wisconsin-Madison



★ UT-Austin
UT-Dallas
U. Maryland

Rice
Texas A&M
NCSU



■ Brown
Columbia
Illinois-UC
MIT/U. Virginia
Nebraska-Lincoln
Northwestern
Penn State
Princeton / UT-Austin
Purdue
Stanford
U. Alabama
UC Berkeley



▲ Virginia Nanoelectronics Center (ViNC)
University of Virginia
Old Dominion University
College of William & Mary

Over 30 Universities in 16 States

Examples of other activities

Nanosystems Engineering Research Centers

For 5 + 5 years (\$3-4 M/year per center)

Environmental, Health and Safety (EHS)

FY 2011: \$33.0M, including supplements to centers

FY 2012: Request \$34.01M (7.5% of NSF NNI)

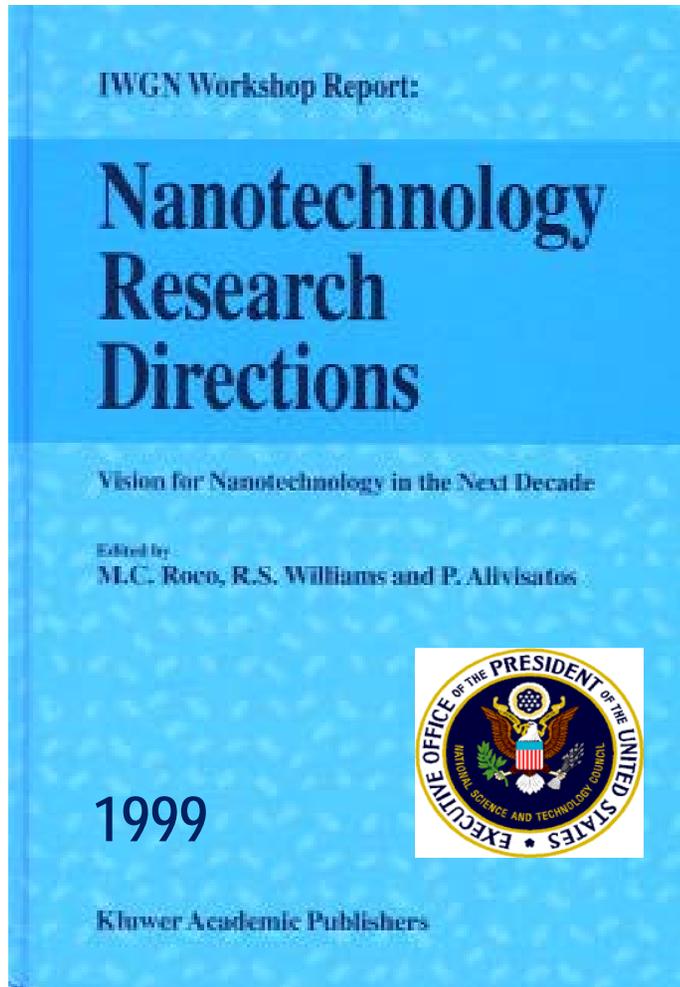
Programs for interaction with industry

GOALI, PFI, ARI, SBIR/STTR, Collaboration NRI ...

International study "Nanotechnology Research Directions for Societal Needs in 2020"

Long-term nanotechnology research directions (2000-2020)

Nano1 (2000-2010)



nano2 (2010-2020)



NSF/WTEC, www.wtec.org/nano2/

Background references

- "Nanotechnology Research Directions", OSTP, also Springer 2000
- "Societal Implications of Nanoscience and Nanotechnology", Springer (2001); updated in 2007
- "The NNI: Past, Present and Future", in Handbook on Nanoscience, Engineering and Technology, CRC, Taylor and Francis 2007
- "Nanotechnology Risk Governance" in Global Risk Governance Framework, Springer 2007
- "Possibilities for Global Governance of Converging Technologies", J. Nanoparticle Res. 2008
- "Mapping Nanotechnology Innovations and Knowledge" Springer 2009
- "Nanotechnology Research Directions for Societal Needs in 2020" Springer 2010