



The DOE Center for Integrated Nanotechnologies

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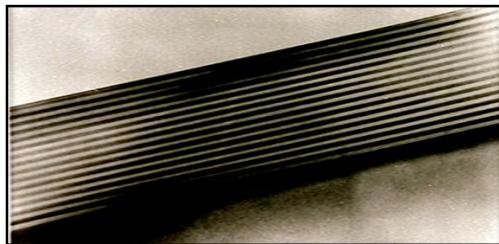
*Commissariat à l'Energie Atomique
November 29, 2005*

Sandia is a Multiprogram Laboratory Operated by Sandia Corporation,
a Lockheed Martin Company, for the United States Department of Energy
Under Contract DE-AC04-94AL85000.

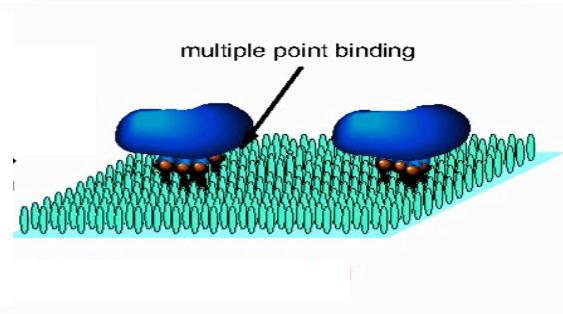


Nanoscience discoveries will have impact via integrated nanotechnologies

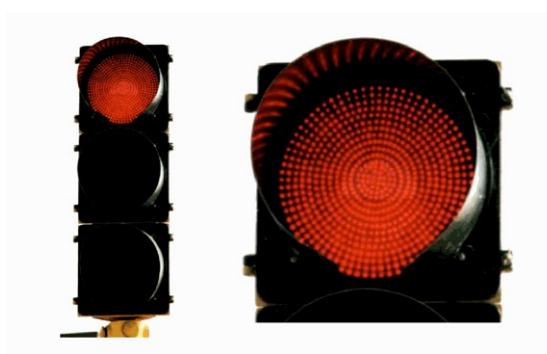
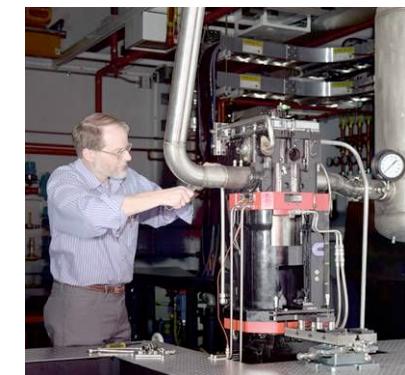
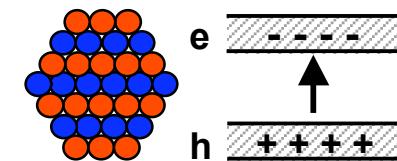
Energy



Health Care



Environment



Connecting scientific disciplines and length-scales is key to success

Center for Integrated Nanotechnologies

Sandia National Laboratories • Los Alamos National Laboratory



- Highly collaborative
DOE National User Facility
- Focused on nanoscience and its
integration across scientific disciplines
and multiple length scales.
- Access to tools and expertise
(pre-competitive or proprietary)
- Explore the continuum from scientific
discovery to the integration of
nanostructures into the micro and
macro worlds.

“One scientific community focused on nanoscience integration”



CINT is one of five U.S. Dept. of Energy Nanoscience Centers

Molecular Foundry
Lawrence Berkeley National Lab.

Center for Nanoscale Materials
Argonne National Lab.

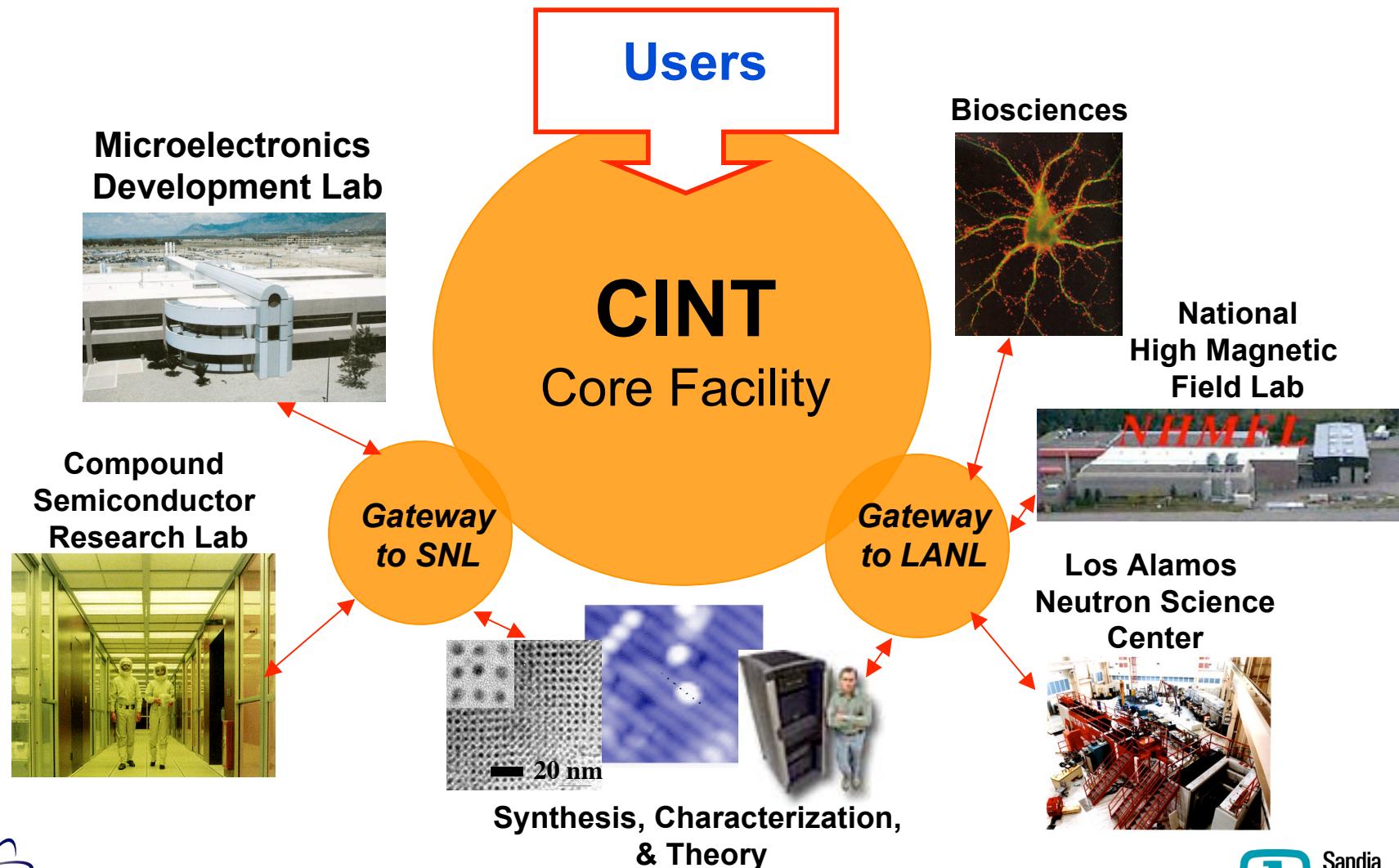
Center for Functional Nanomaterials
Brookhaven National Lab.

**Center for Integrated
Nanotechnologies**
Sandia National Labs.
Los Alamos National Lab.

Center for Nanophase Materials Sciences
Oak Ridge National Lab.



Two Laboratories creating one community focused on nanoscience integration





The CINT Core/Gateway model embodied with physical user facilities

Core Facility in Albuquerque



**CINT Gateway to Sandia
Nanomaterials/Microfabrication**



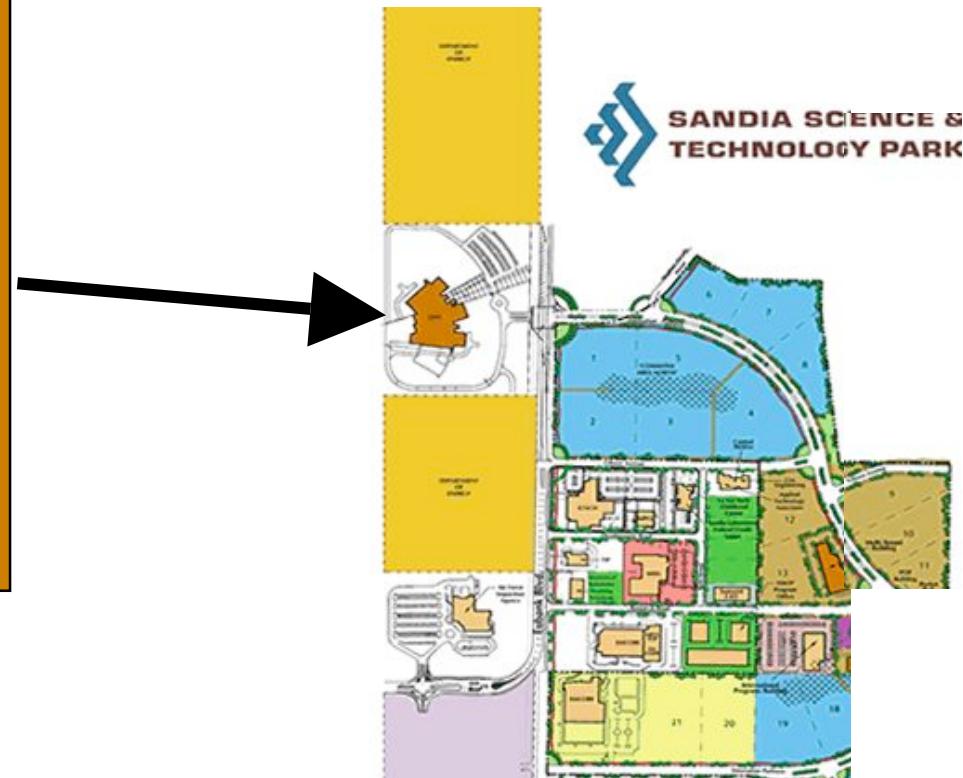
**CINT Gateway to Los Alamos
Nanomaterials/Biosciences**

**Buildings Complete
Begin Operations
Fully Operational**

**December 2005
April 2006
May 2007**



Core Facility is located adjacent to the Sandia Science & Technology Park



- Low vibration characterization labs
- Chemical/biological synthesis labs
- Class 1000 clean room
- 93,000 GSF



Construction Status - Core Facility





Key laboratory assets will be available through Gateway Facilities

CINT Gateway to Los Alamos (Nanomaterials/Biosciences)



Biosciences

Nanomaterials

Theory & Computing

Visitor Space

CINT Gateway to Sandia (Nanomaterials/Microfabrication)



Microsystems - MESA

Nanomaterials

Theory & Computing

Visitor Space



Construction Status--LANL Gateway





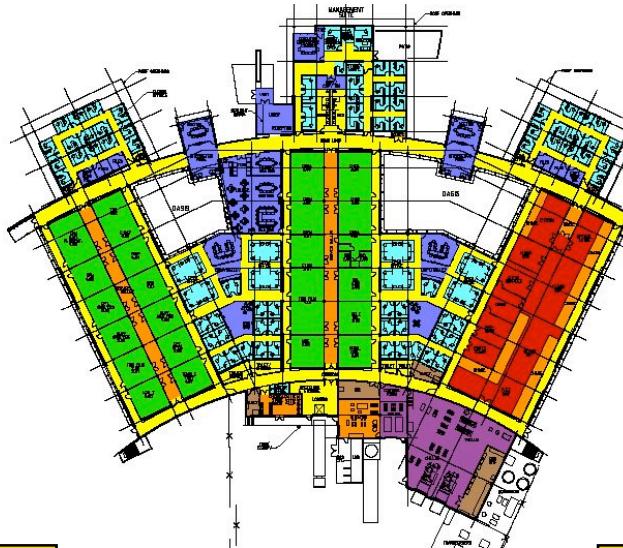
CINT laboratories are supported by state-of-art special equipment

Characterization

- TEM, SEM, FE-SEM
- AFM
- FTIR, UV/VIS, X-ray
- Nano-indenter
- Low Temp Transport
- Ultra-fast Laser Spec.
- Raman Spec.

Gateway to Sandia

- AT-STM
- IFM
- Chemistry labs
- LB Film
- μ -fluidics



Synthesis

- MBE
- PLD
- P-CVD
- Wet Chem
- Bio

Integration

- E-beam lithography
- Photolithography
- Thin Film Deposition
- REI, Plasma Etch

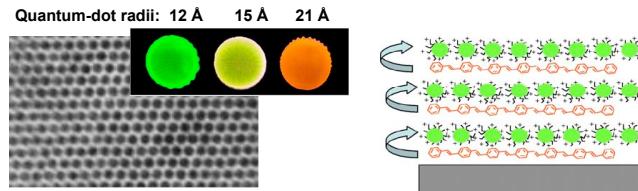
Gateway to Los Alamos

- NSOM, AFM
- Environmental SEM
- Nano-indenter
- Ultra-fast Laser
- Computer Cluster

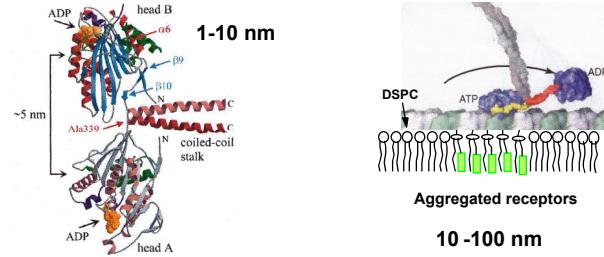


CINT Thrust Areas provide expertise for integration science challenges

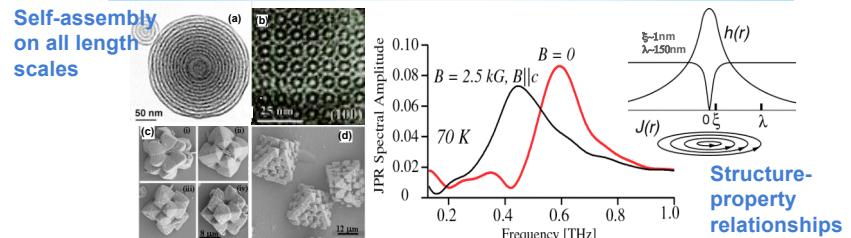
Nanoelectronics & Nanophotonics: Precise control of electronic and photonic wavefunctions



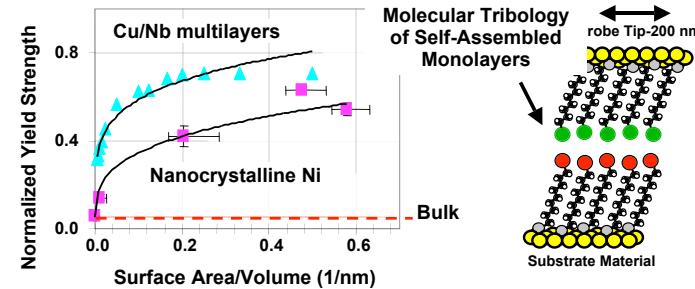
Nano-Bio-Micro Interfaces: Biological principles & functions imported into artificial bio-mimetic systems



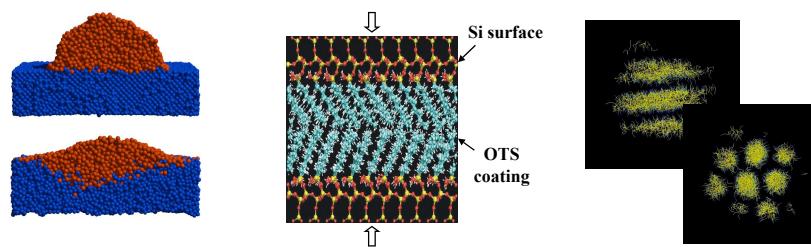
Complex Functional Nanomaterials: Relationships between synthesis, structure and complex and emergent properties



Nanomechanics: Understanding the mechanical behavior of nanostructured materials

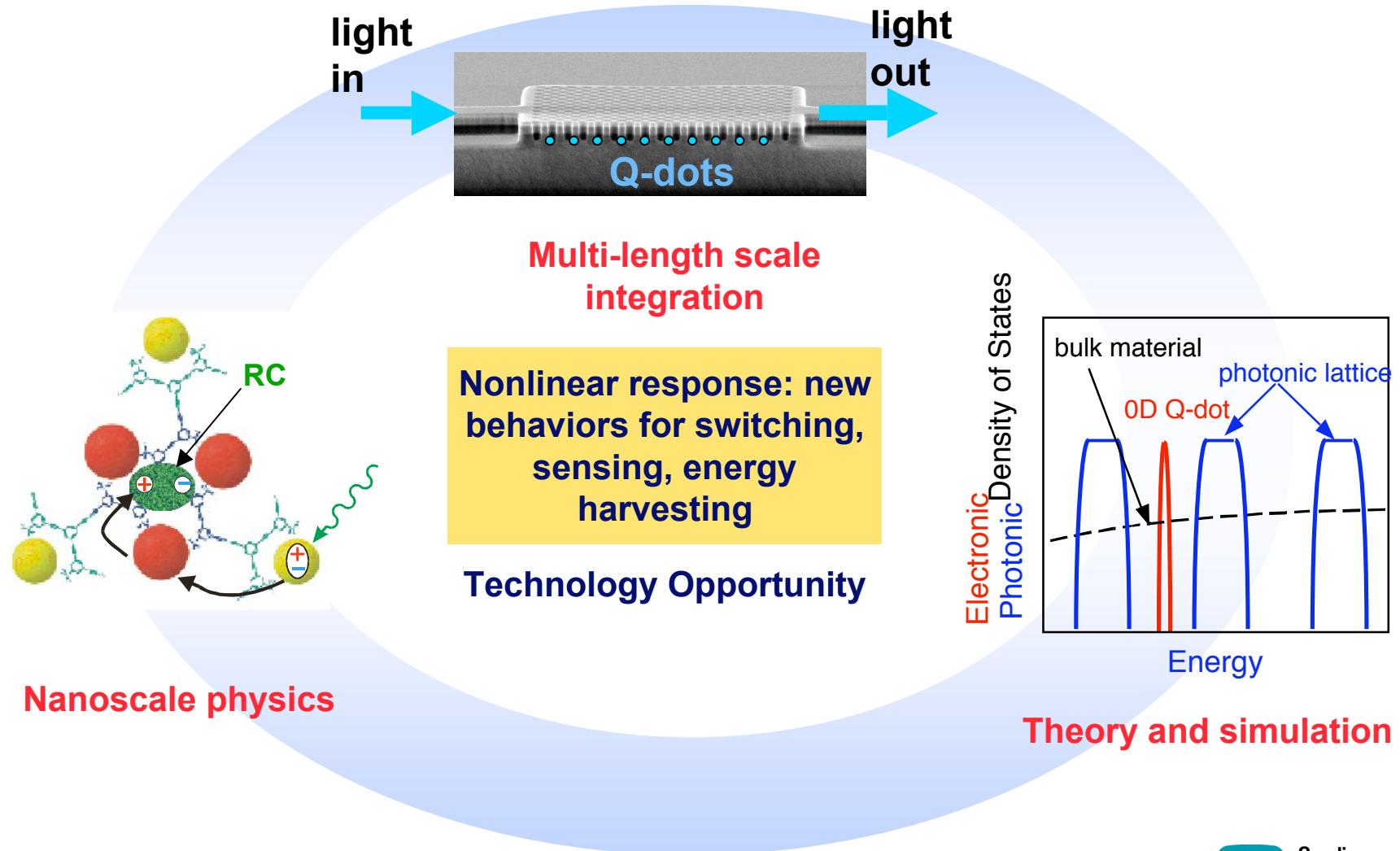


Theory & Simulation: Theoretical, modeling and simulation techniques for multiple length and time scales and functionality





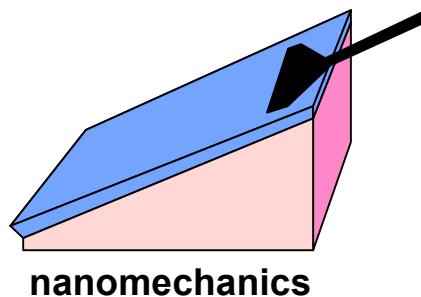
Integration Science Challenge: Energy transfer



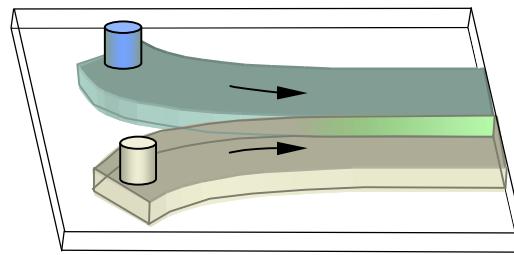


New techniques will be developed and made available to user community

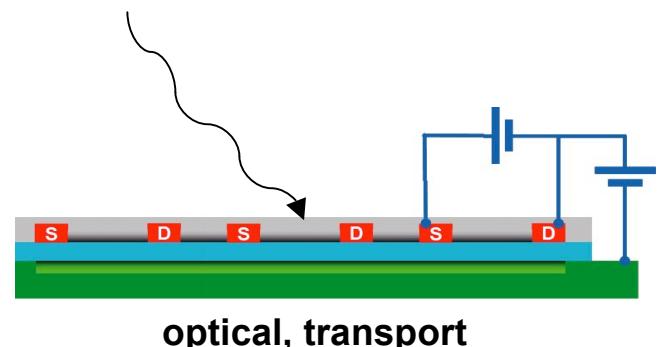
- Innovative Instrumentation
 - Atom Tracking STM
 - Magnetic Force Microscope
 - Interfacial Force Microscope
- Theory and Simulation
- Discovery Platforms™



nanomechanics



microfluidics

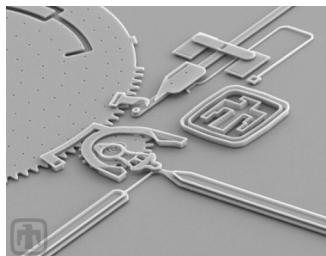


optical, transport

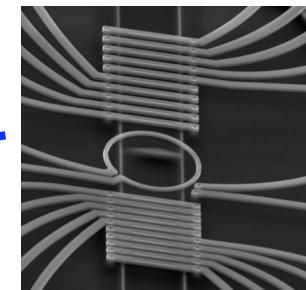


CINT Discovery Platforms™ are micro-labs for nanoscience exploration

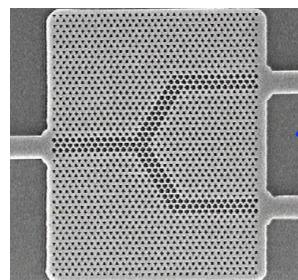
Mechanics



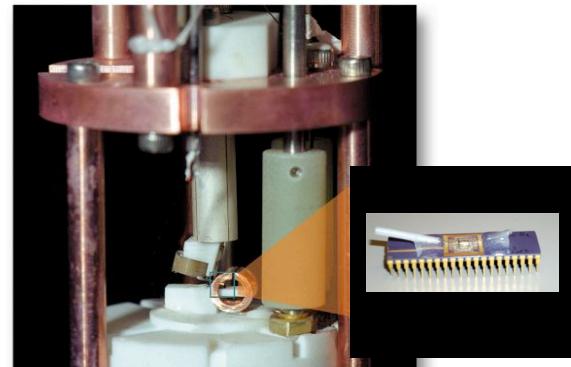
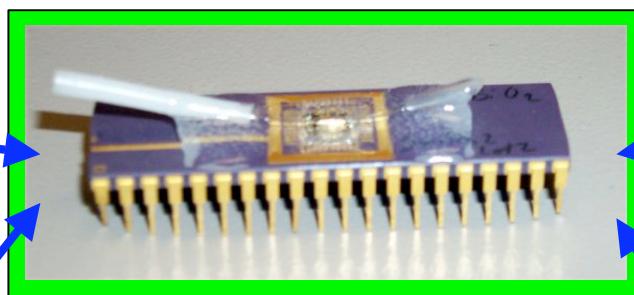
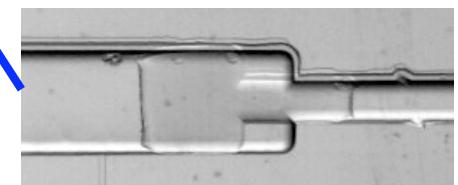
Electronics



Optics



Fluidics



Discovery Platforms™ will be compatible with characterization instruments



Researchers access CINT via the User Program

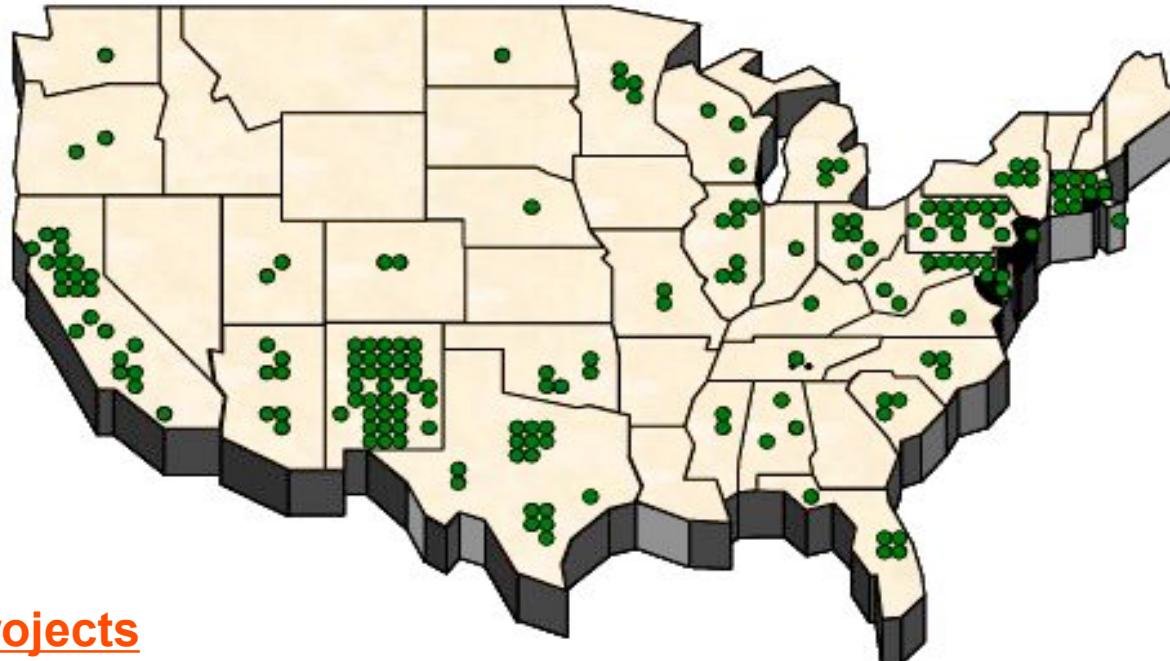
- **Universities**
 - Postdocs, students and visiting faculty researchers.
- **Industry**
 - Pre-competitive and proprietary research mechanisms.
- **Other Laboratories**
 - Other Federal agencies.
- **International Science Community**
 - Open to the international science community

Key Aspects of User Program

- Open access to facilities based on user proposal quality
- Spectrum of user modes
 - Access to equipment
 - Collaborative research
 - Multi-year projects
- External evaluation of proposals
- Mechanisms for proprietary work
- **Normal operations start April 2006**



External users are already working at CINT



Jump-start Projects

Two rounds (2003 & 2004)

188 proposals submitted

68 projects approved

40 institutions (37 academic)

23 states, 3 foreign countries

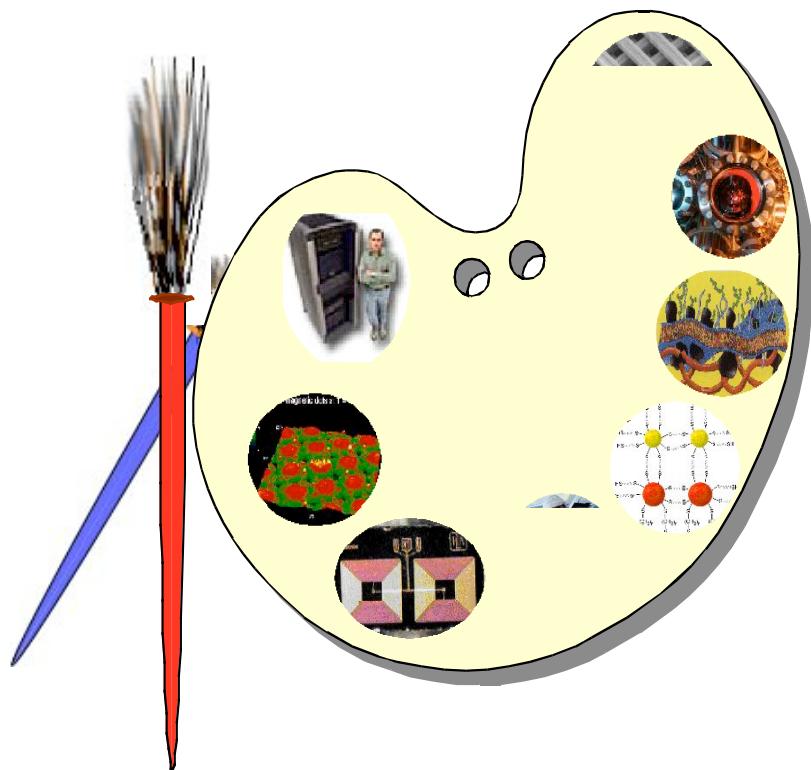
3rd Jump-start Round (2005)

70 proposals received

21 additional projects launched



CINT: A National user facility for nanoscience integration research



Upcoming Events

4th CINT Users Workshop
Albuquerque, NM
January 12-13, 2006

Next Call for User Proposals:
January 2006