



# The DOE Center for Integrated Nanotechnologies

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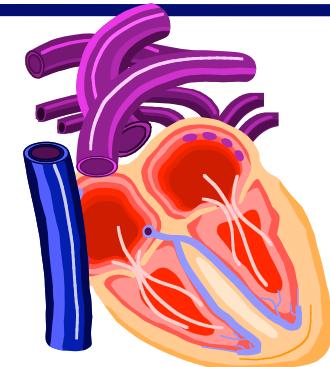
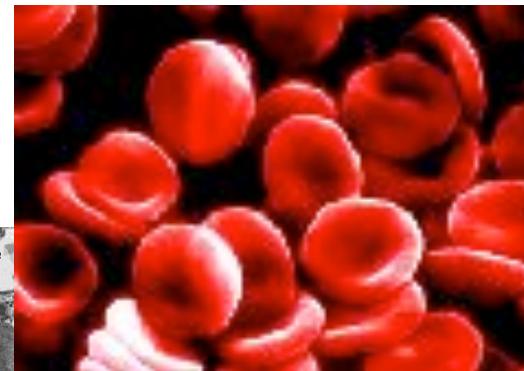
*Albuquerque Economic Development  
July 28, 2005*

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.

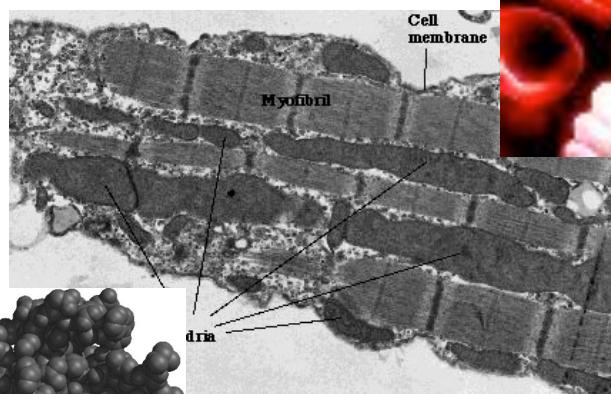


# Living systems integrate nanotechnology

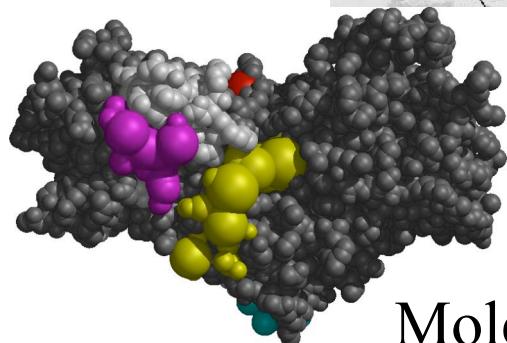
*Nanoscale “machines”  
are coupled into the  
micro and macro world.*



Organs and  
Tissues



Cells



Sub-cellular mechanical structure

Molecules and Chemical Pathways

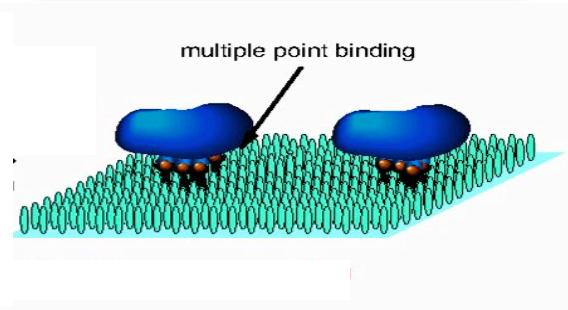


# ***Integrated Nanotechnology will impact our world***

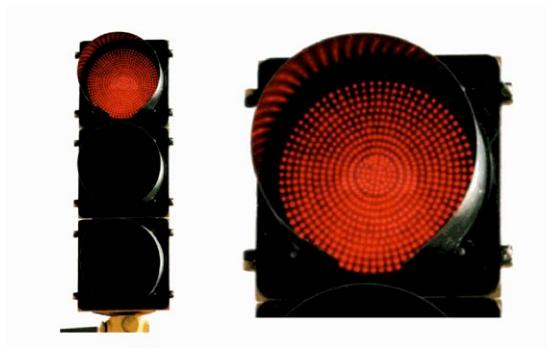
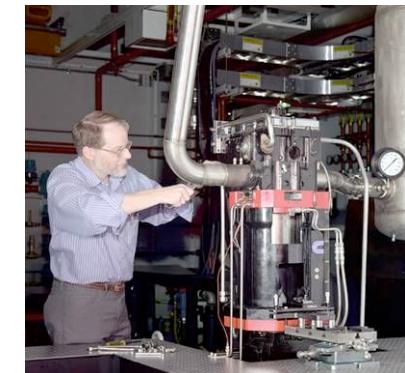
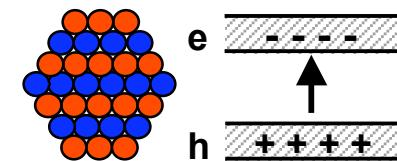
## **Energy**



## **Health Care**



## **Environment**



**Future products will have “nanotech inside.”**

# Center for Integrated Nanotechnologies

Sandia National Laboratories • Los Alamos National Laboratory



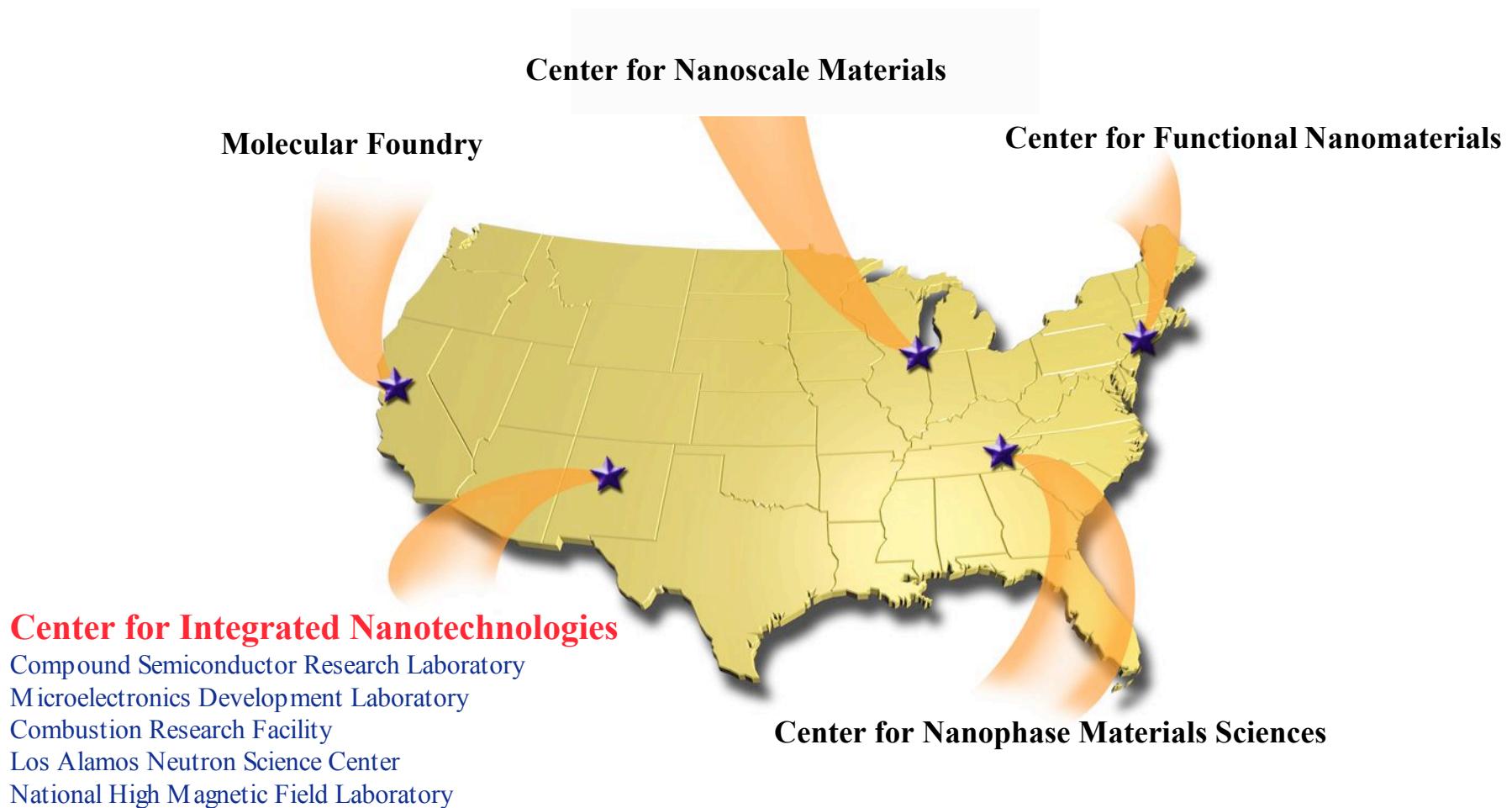
- Highly collaborative  
DOE National User Facility
- Focused on nanoscience and  
its integration across scientific  
disciplines and multiple length  
scales.
- Open access to tools and  
expertise to explore the  
continuum from scientific  
discovery to the integration of  
nanostructures into the micro  
and macro worlds.

***“One scientific community focused on nanoscience integration”***



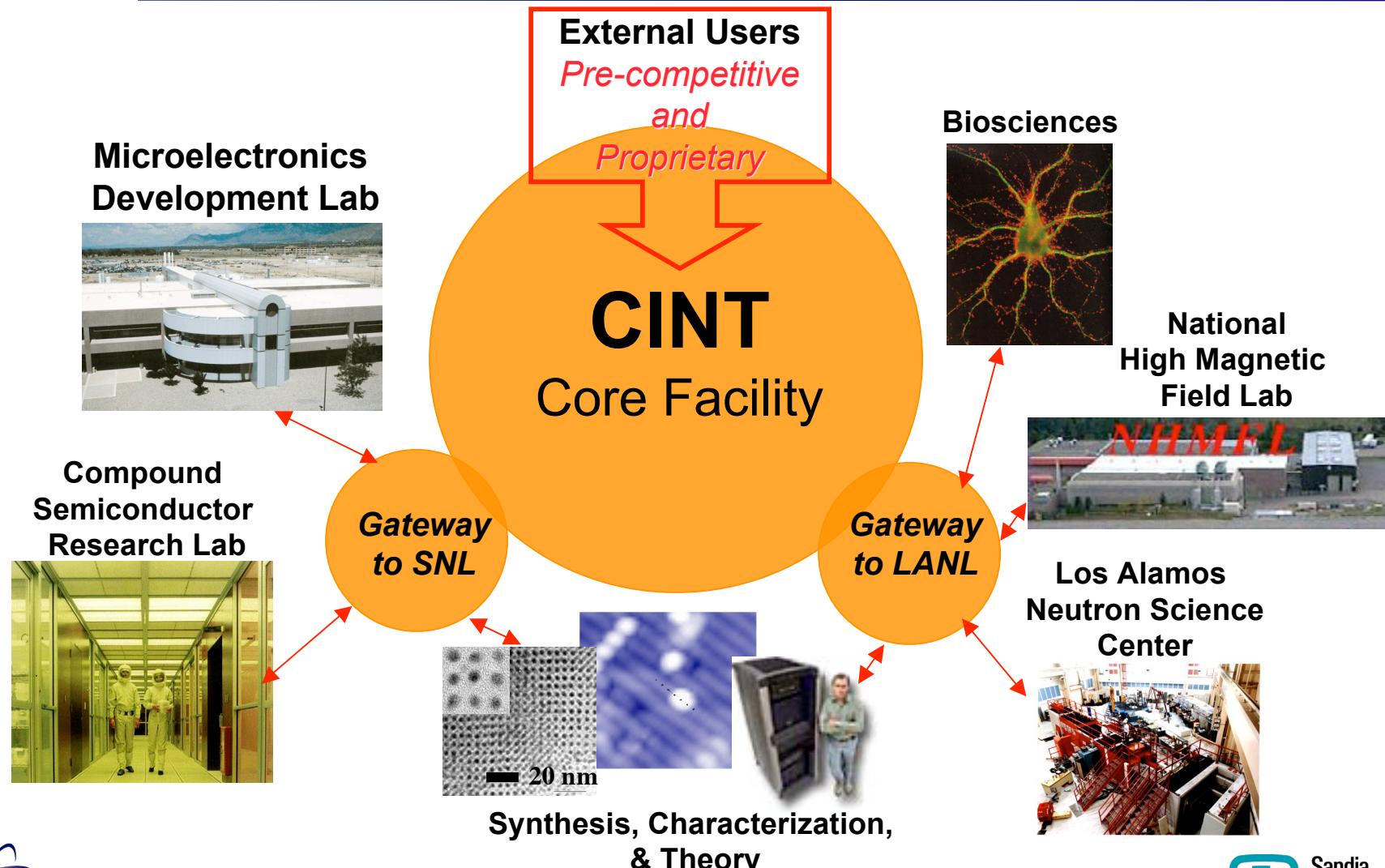
# ***CINT is one of five Department of Energy Nanoscience Centers***

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# One scientific community that spans two National Laboratories





# *The CINT Core/Gateway model embodied with physical user facilities*

## Core Facility in Albuquerque



**CINT Gateway to Sandia  
Nanomaterials/Microfabrication**



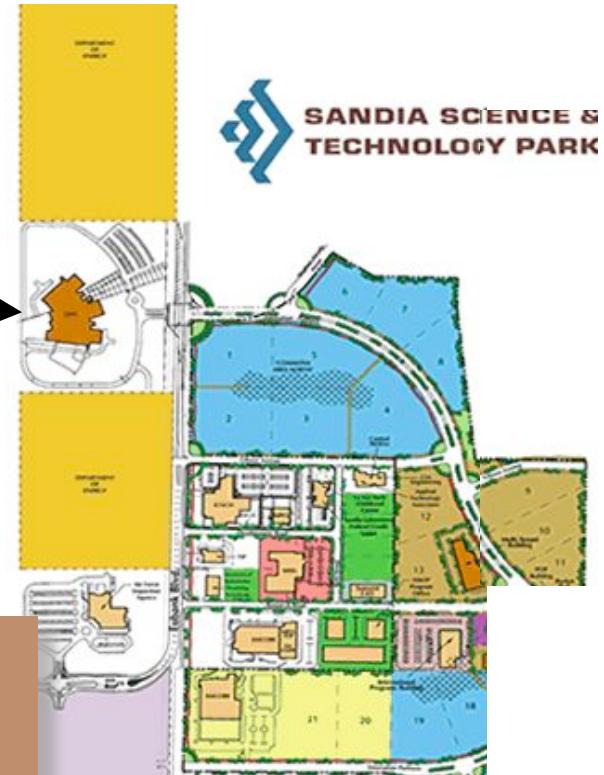
**CINT Gateway to Los Alamos  
Nanomaterials/Biosciences**

**Buildings Complete  
Begin Operations  
Construction Complete**

**November 2005  
April 2006  
June 2007**



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



- Low vibration for characterization
- Chemical/biological synthesis
- Clean space for Integration
- Interaction areas
- Visitor office space
- High-speed communications
- 93,000 GSF; Complete November 2005



# 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)**



**Microfabrication/MESA**

**Nanomaterials**

**Theory & Computing**

**Visitor Space**



# Construction Status: LANL Gateway

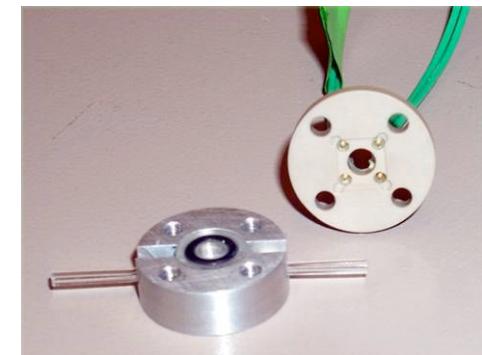
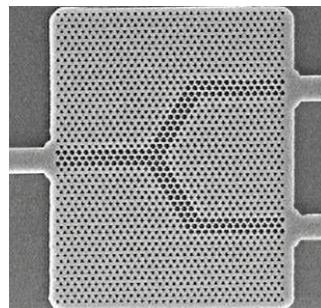
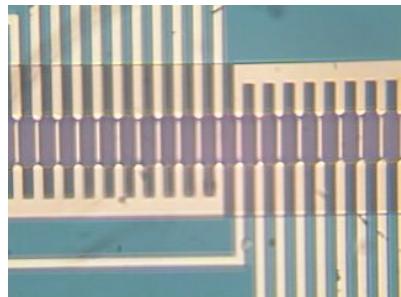




# ***New techniques will be developed and made available to user community***

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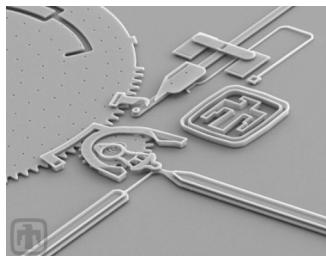
- Innovative Instrumentation
  - Atom Tracking STM
  - Magnetic Force Microscope
  - Interfacial Force Microscope
- Theory and Simulation
- Discovery Platforms™



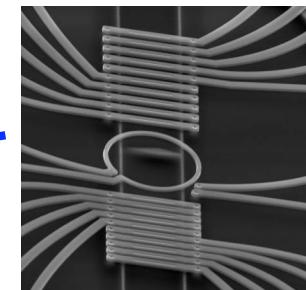


# *CINT Discovery Platforms™ are micro-labs for nanoscience exploration*

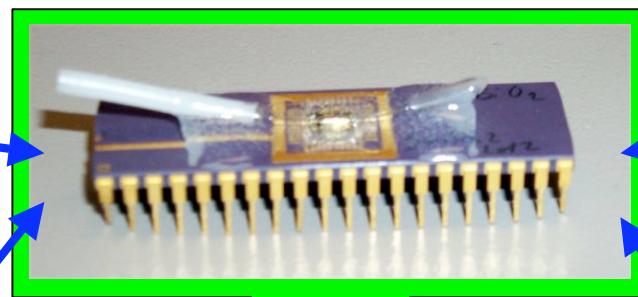
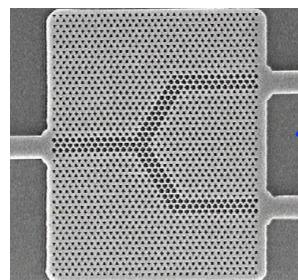
Mechanics



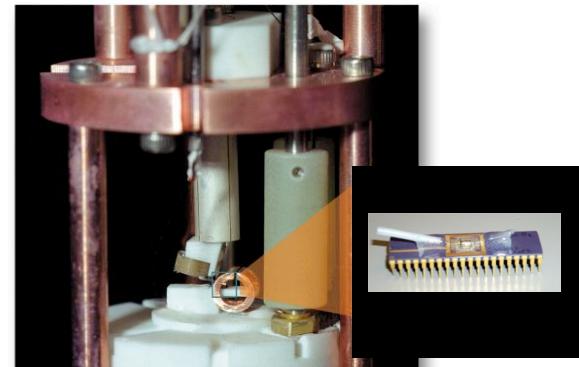
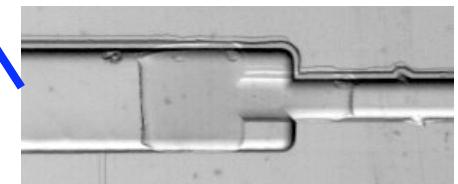
Electronics



Optics



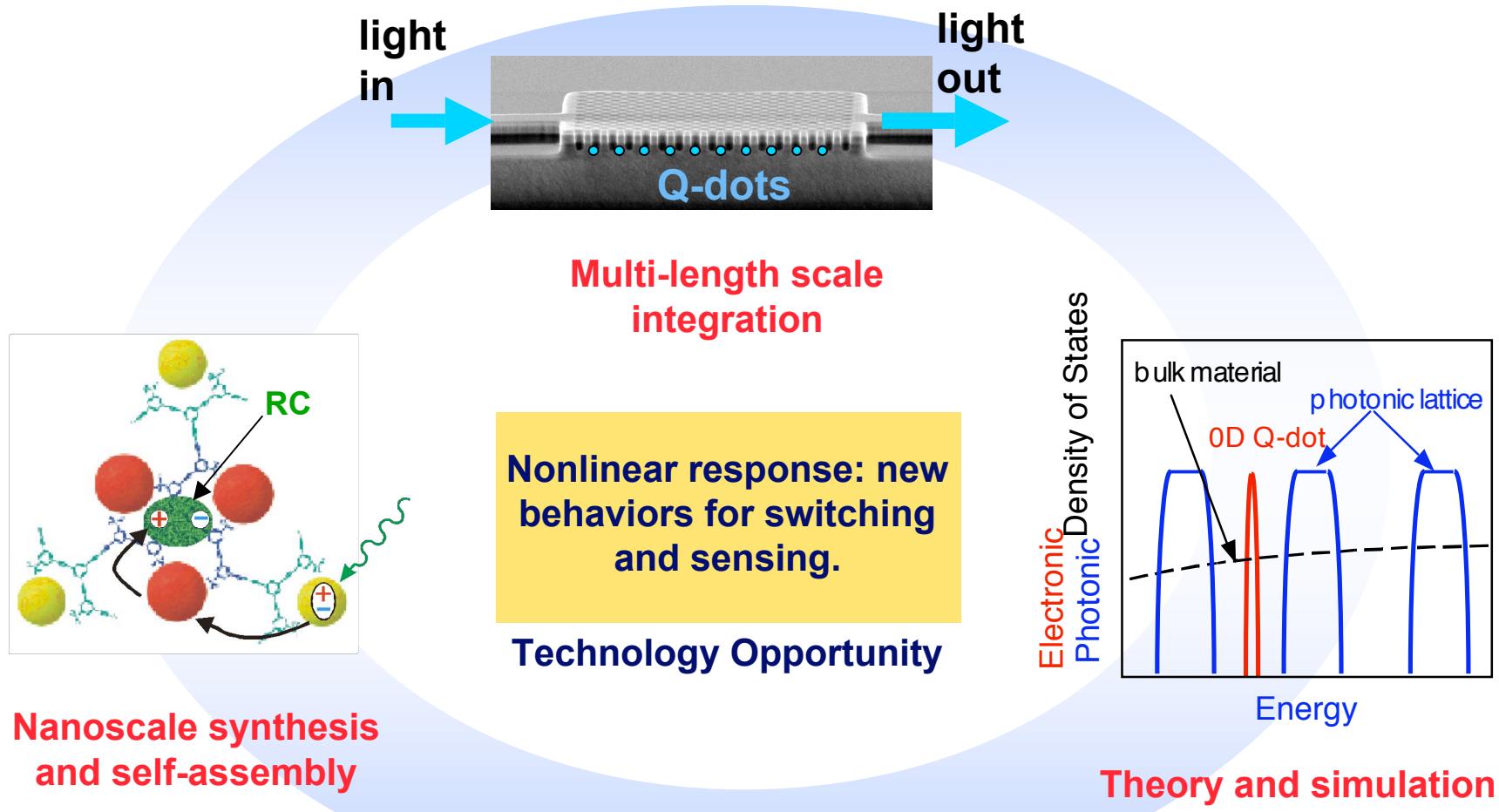
Fluidics



*Discovery Platforms™ will be compatible with characterization instruments*



# Understanding energy transfer will enable new communications technologies

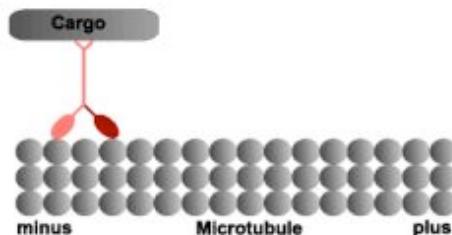




# *Exploiting natural processes to create smarter materials*



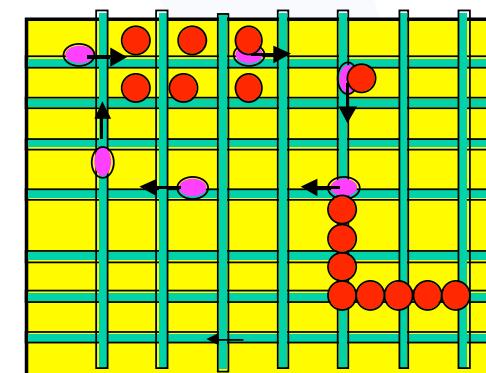
## New Materials



## Active Assembly

Active assembly, healing,  
repair, reconfiguration,  
adaptation

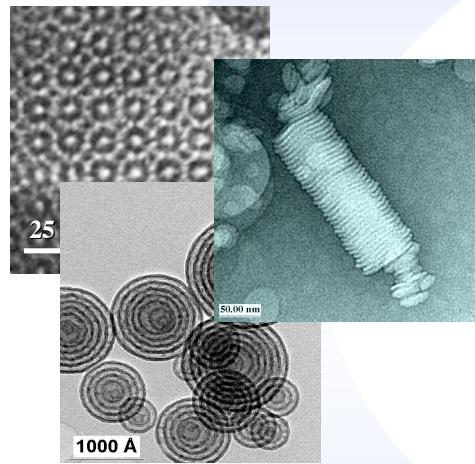
## Technology Opportunity



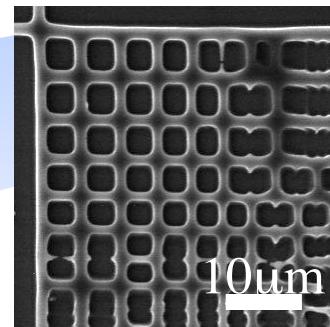
## Thermodynamic/Kinetic Models



# Combining top-down and bottom-up approaches in manufacturing



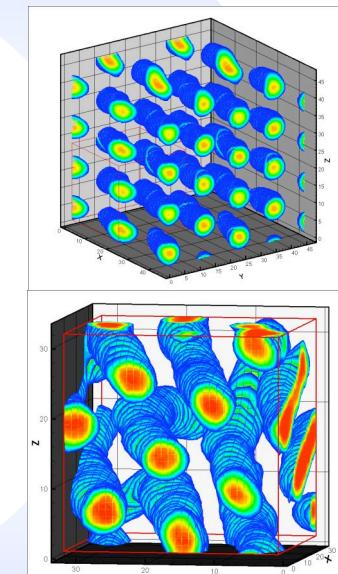
**Molecular Assembly**



**Microscale Templates**

**New functions from complex and hierarchical materials/devices**

**Technology Opportunity**



**Directed Assembly and ordering**



# ***Researchers access CINT via the User Program***

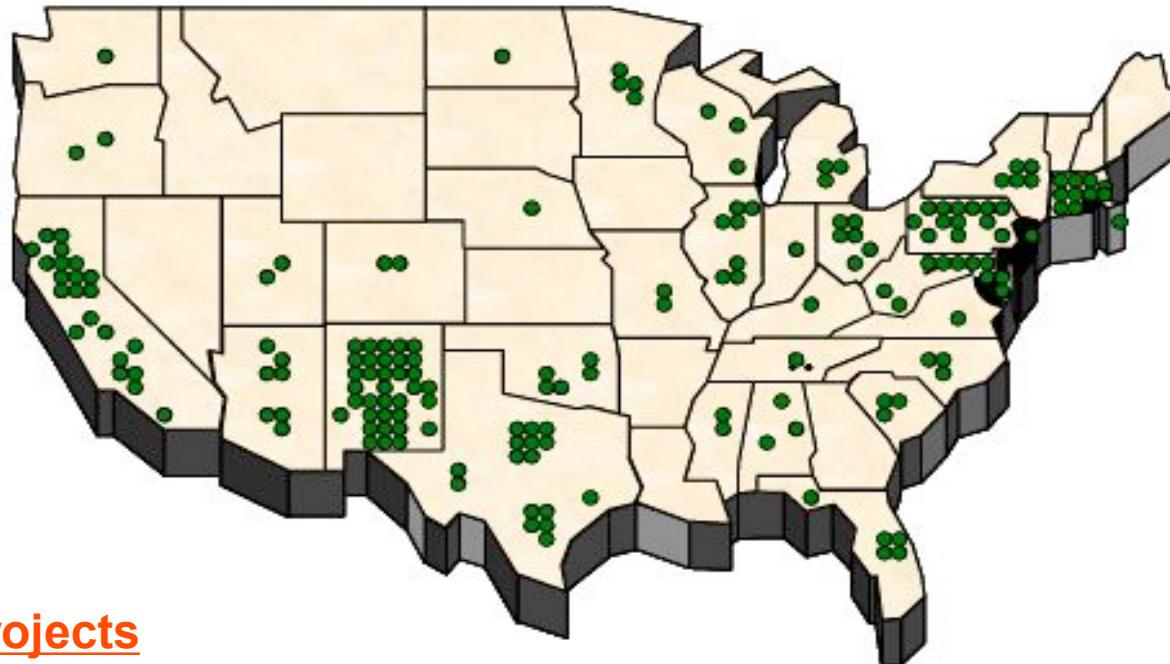
- **Universities**
  - Postdocs, students and visiting faculty researchers.
- **Industry**
  - Pre-competitive and propriety research mechanisms.
- **Other Laboratories**
  - Other Federal agencies.
- **International Science Community**
  - Open to the international science community

## **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
- User program “jump-started” in FY03
- **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 (incl. 3 companies)

23 states, 3 foreign countries

## 3rd Jump-start Round (2005)

~70 Proposals received

Approved projects will start in August



## ***Private sector participation in CINT***

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- **Industrial representation on the CINT Governance Board**  
**Herb Goronkin, President, Technology Acceleration Assoc.**  
*(VP, Motorola, retired)*
- **Pre-competitive jump-start user proposals from industry**  
(e.g., IBM, ACREO, Lake Shore Cryogenics)
- **New DOE User Agreement for joint ownership of intellectual property from CINT collaborations**
- **CINT Discovery Platforms™ -- Bringing CINT capabilities to you!**



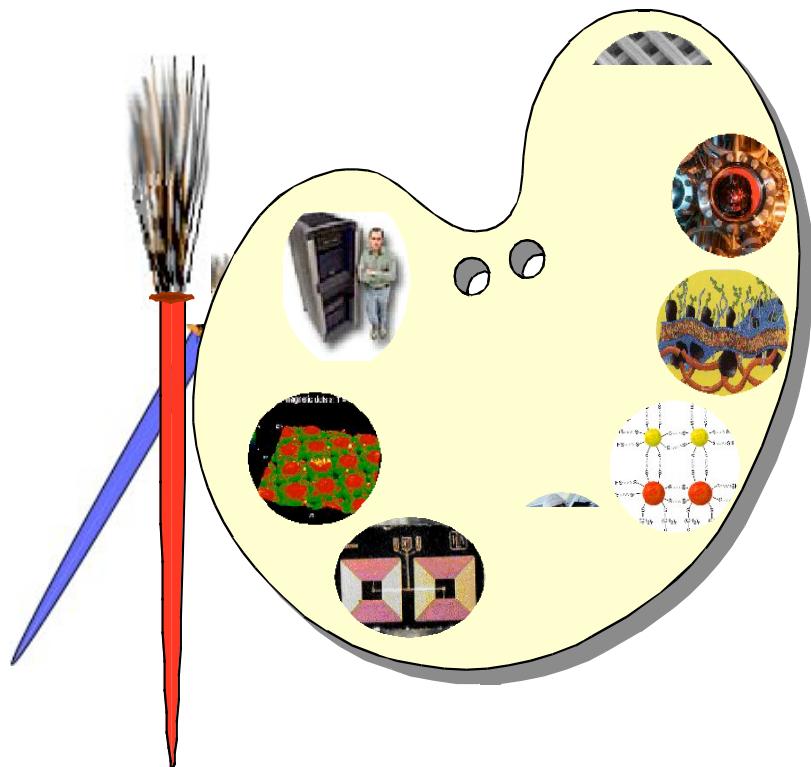
# ***CINT begins normal operations in April 2006***

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- **New CINT Facilities with full-time staff to support users**
- **CINT Scientists to advance the state-of-the-art in nanoscience integration research**
- **Initial Discovery Platforms™ available to users**
- **User Proposals for proprietary research (full cost recovery)**
- **Short-term and multi-year user proposals**
- **Continuing access to capabilities and expertise at both Los Alamos and Sandia National Laboratories.**



# *CINT: Putting nanotechnology to work!*



## Dedicated Facilities

Clean rooms  
Synthesis  
Characterization

## Access to National Laboratories

Microfabrication  
Biosciences  
Computing  
Nanomaterials

## No Cost Access

Peer reviewed proposals  
University/Industry/Gov. Lab.  
Publication required

## Proprietary Access

Full cost recovery