



THE Ames Laboratory  
*Creating Materials & Energy Solutions*



IOWA STATE  
UNIVERSITY

# The Ames Laboratory Overview and Opportunities

Cynthia J. Jenks

July 22, 2009

# The Ames Laboratory at a Glance

<b>Location:</b>	Ames, IA
<b>Contract Operator:</b>	Iowa State University of Science and Technology (ISU)
<b>Website:</b>	<a href="http://www.ameslab.gov/">http://www.ameslab.gov/</a>
<b>Annual Budget:</b>	\$32 million
<b>People:</b>	350 Full-time equivalent employees 250 ISU grad/undergrad students, student employees, and associates 200 Facility users, visiting scientists, and associates

# The Ames Laboratory's *Mission*

The Ames Laboratory creates materials,  
inspires minds to solve problems,  
and addresses global challenges.



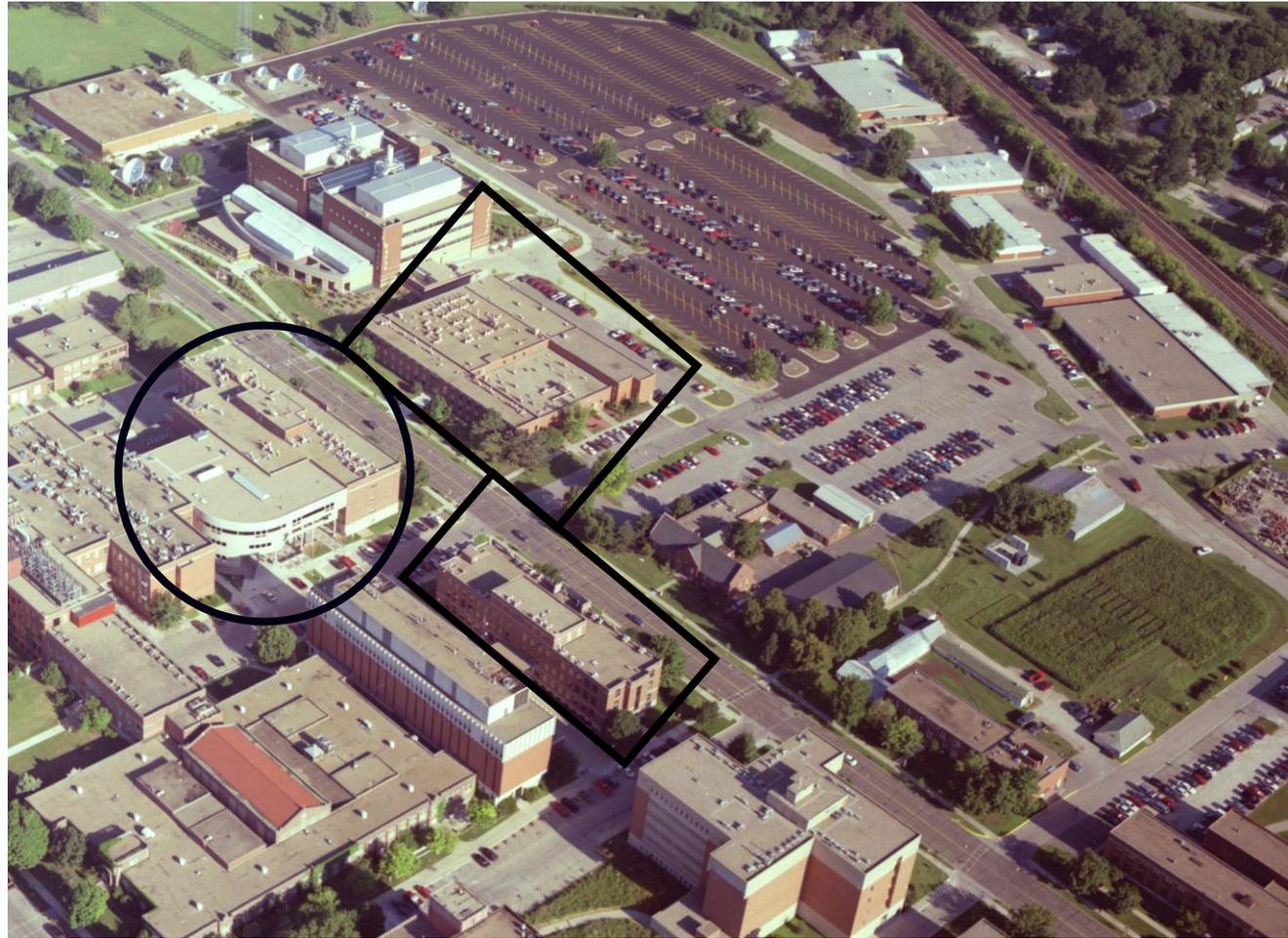
THE Ames Laboratory  
Creating Materials & Energy Solutions

U.S. DEPARTMENT OF ENERGY

2009

Creating Materials and Energy Solutions

The highest  
integration of  
any national  
lab with a  
university  
campus



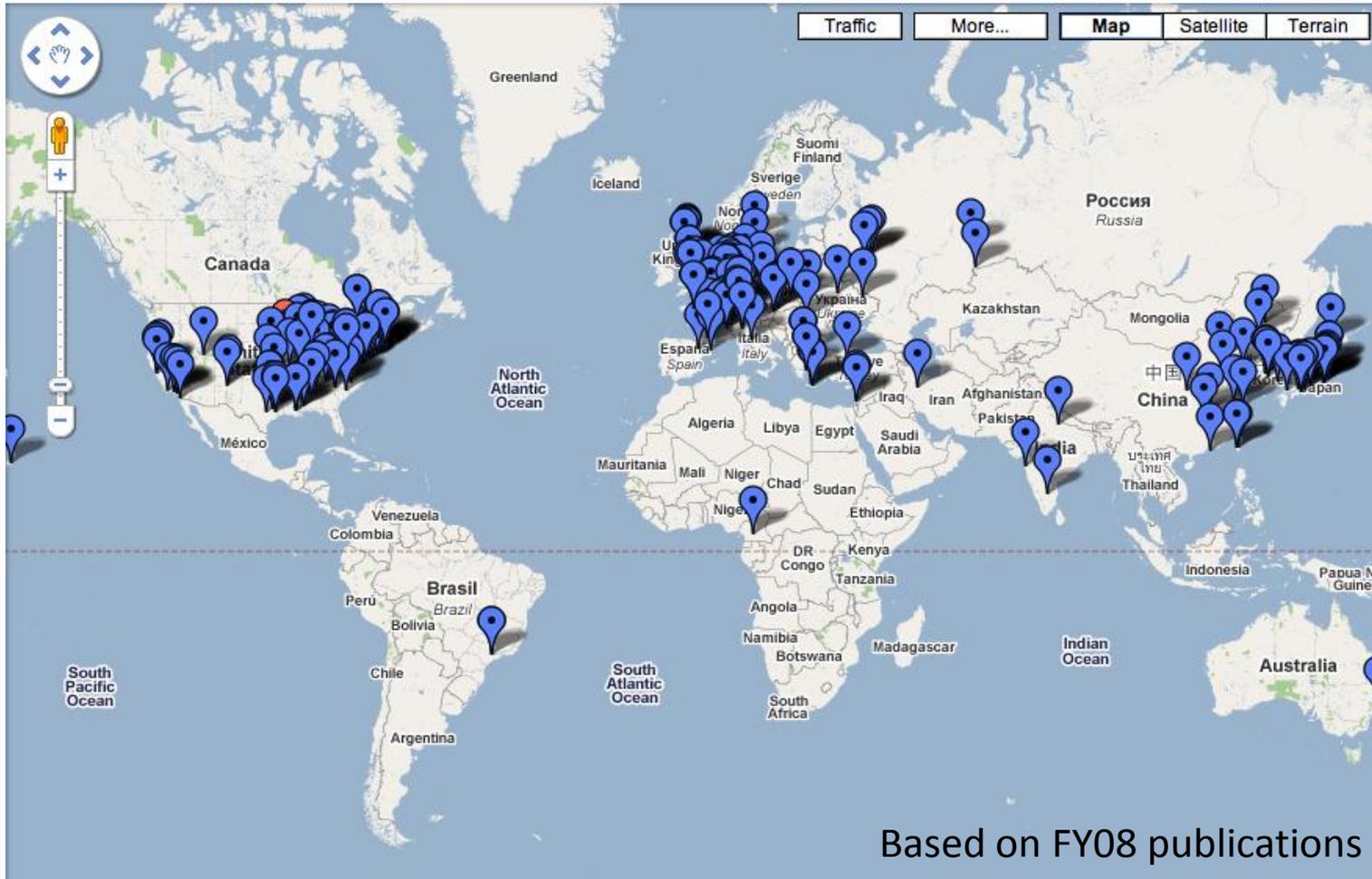
THE Ames Laboratory  
*Creating Materials & Energy Solutions*

U.S. DEPARTMENT OF ENERGY

2009

Creating Materials and Energy Solutions

# Interactions World-Wide



# U.S. Interactions



Based on FY08 publications

# Signature Strengths

- Solid-state materials discovery, synthesis, and design
- Rare earths
- Catalysis
- Advanced analytical instrumentation
- Forensic science
- Technology transfer

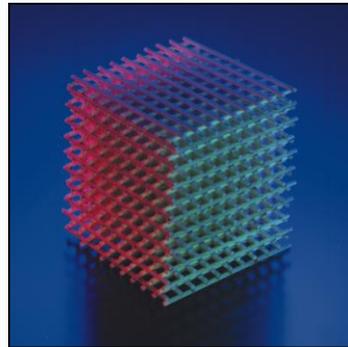


Praseodymium fluoride

# Partnership Opportunities

## Materials Research for Energy Applications

- Novel optical materials
- Materials design, preparation & synthesis
- Magnetic materials & correlated electron systems
- Complex intermetallic compounds
- Catalytic materials



Photonic Crystals



Nanofarming oil  
from algae

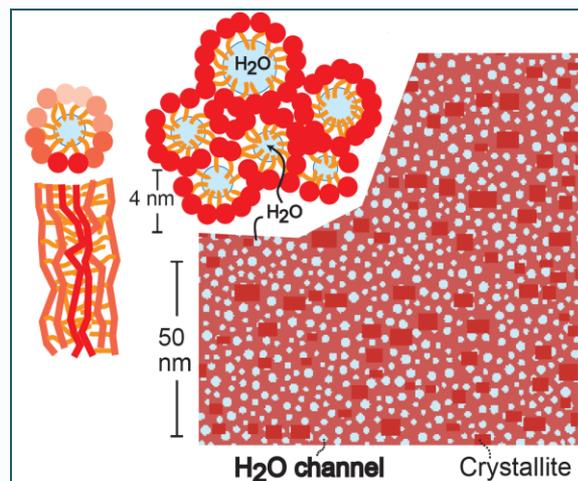
### Facilitated by

- Theory integrated with experiment
- Scalable Computing Lab
- Interdisciplinary teamwork
- Materials Preparation Center

# Partnership Opportunities

## Analytical Techniques & Instrument Development

- Solid-state NMR
- Single-cell analysis
- Single molecule analysis
- Electrochemically modulated liquid chromatography
- Surface enhanced Raman scattering
- Mass spectrometer techniques and instrument design



structure of Nafion

Use NMR to pull out not just composition information but also location of components at interfaces, for example.

Solid-state NMR:

Adsorbates on catalysts

Organic-inorganic interfaces in nanocomposites

Nanoscale structures of plant cell walls

Magnetic molecule spin dynamics



THE Ames Laboratory  
Creating Materials & Energy Solutions

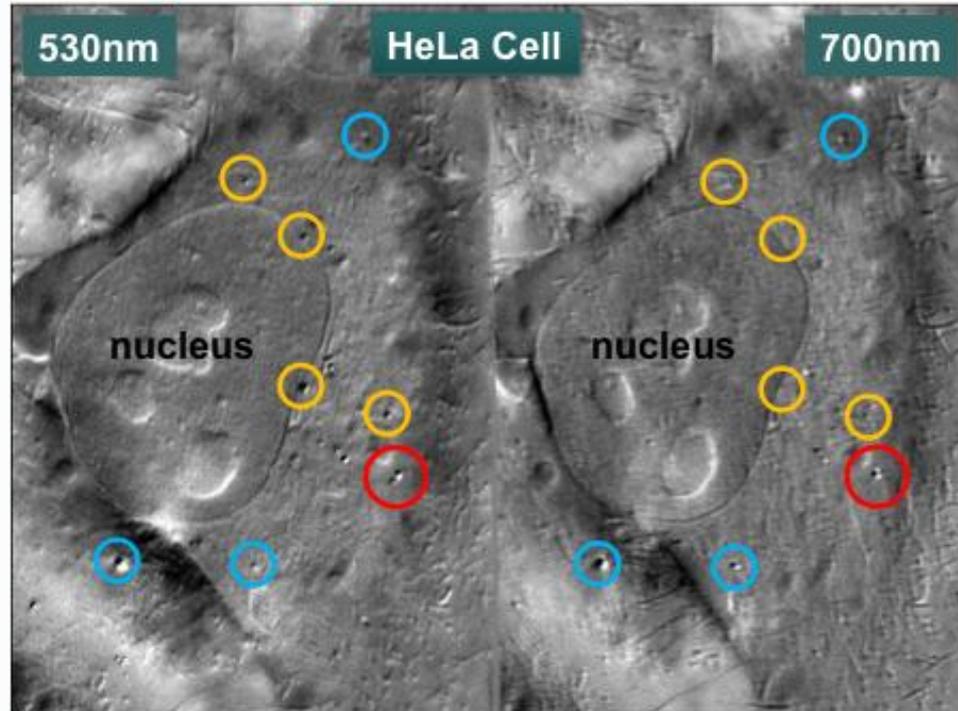
U.S. DEPARTMENT OF ENERGY

2009

Creating Materials and Energy Solutions

# Differential Interference Contrast Microscopy

## Optically Switchable, Fluorescence-Like



○  
40-nm AuNPs

○  
organelles  
or  
spherical vesicles

○  
2 close-by particles;  
only one is gold

## Advantages

- Detectability of objects smaller than the diffraction limit of light
- Better vertical resolution and thus good optical sectioning
- Non-intrusive imaging



THE Ames Laboratory  
Creating Materials & Energy Solutions

U.S. DEPARTMENT OF ENERGY

2009

Creating Materials and Energy Solutions

# Computational Sciences

- Middleware (software that connects software components or applications typically running across a network)
- Creation of an interactive visual engineering environment to design new products. Ames Laboratory researchers along with collaborators at NETL and Reaction Engineering International have developed open-source software to look at the physics behind power plant operation. The software enables process and energy industries engineers to design next-generation plants with high efficiencies and near-zero emissions by collaboratively analyzing process simulations with engineering data.



2009



THE Ames Laboratory  
Creating Materials & Energy Solutions

U.S. DEPARTMENT OF ENERGY

2009

Creating Materials and Energy Solutions

# Energy Applications

- Magnets (motors, magnetic refrigeration)
- Battery technology
- Wind technology (climate modeling, NDE)
- Building efficiency



# For Additional Information:

Visit our website at <http://www.ameslab.gov>

or

contact Cynthia Jenks at [cjenks@ameslab.gov](mailto:cjenks@ameslab.gov)