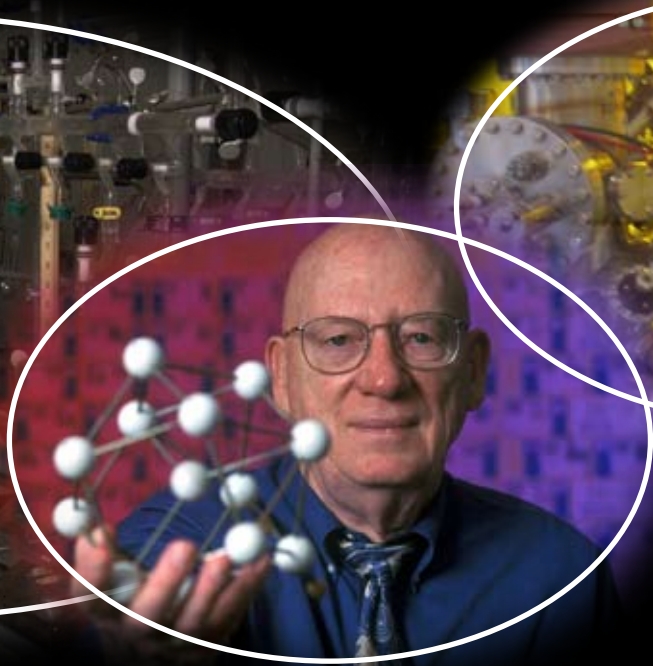
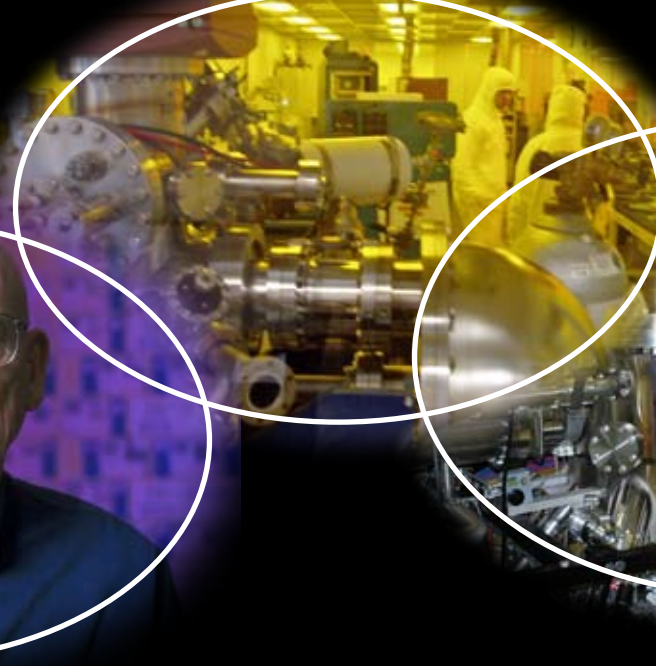


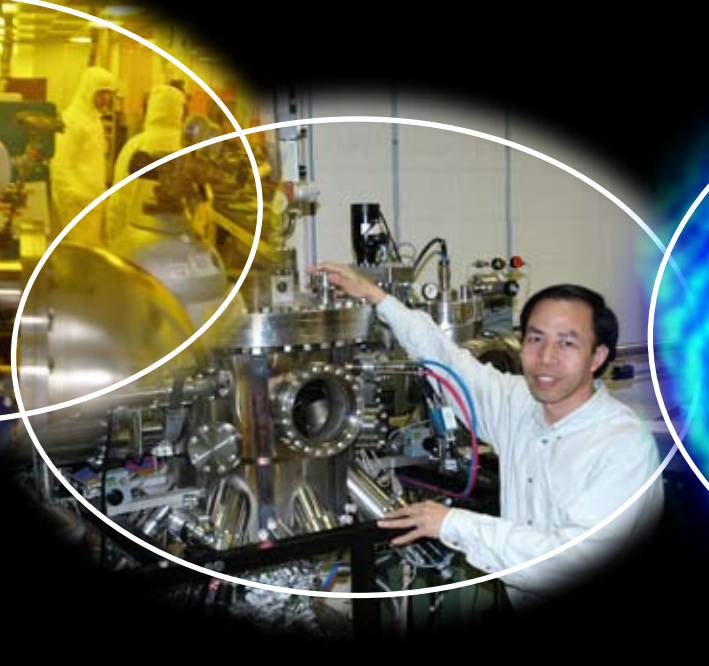
Boron Nanochemistry



Nanosynthesis



Nanoheterostructures and sensors



Controlled Nanoarchitectures



Institute for NanoScience,
Engineering & Technology
Northern Illinois University
www.niu.edu/inset

Clyde Kimball
Executive Director

Michel van Veenendaal
*Deputy Director
Liaison, ANL*

Alan Genis
*Deputy Director
Corporate Outreach*

Who we are

Northern Illinois University is a public institution with extensive undergraduate and graduate programs in the sciences, engineering, the social and applied sciences, the humanities, the health fields, music, and professional education. It has outstanding scholarship capabilities embedded in its graduate and honors offerings which interface with a high quality undergraduate curricula. It has outreach programs in the sciences which visit classrooms and touch students from K-12 in order to communicate the excitement of science at its frontiers. Real-time, video-linked, computer control of remote experiments from NIU has been established for teaching, outreach, and research. NIU

collaborates with universities, industry, and government laboratories in its multifaceted research programs.

What we do

Top scientists and graduate students in physics and engineering explore the mesoscopic world, advance nanoscience theory and develop next-generation nano-materials and applications.

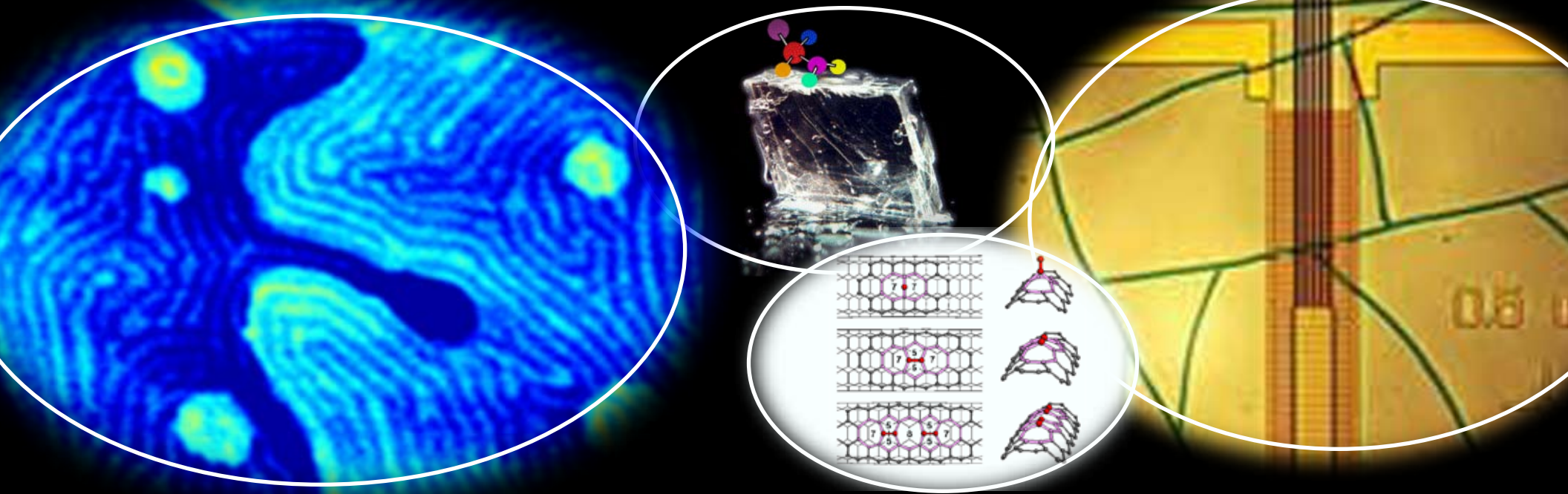
Our Research Projects

- Determination of electronic structures and associated behaviors of nanomaterials.
- Soft x-ray emission electron microscopy.
- Determination of the magnetic behavior and its anisotropies using polarized x-rays.

- Synthesis and in-situ structural analysis of nanolayered heterostructures; nano-scale templates and novel shape quantum dots.
- Combinatorial Chemistry.
- Advancement of theory in nanoparticle science and nano-materials.
- Study of behavior of nanoscale atomic ordering.
- Dynamics of polymer/nanoparticles systems.
- Light scattering and small angle x-ray.
- Scattering studies of self-assembled systems; study of viscosity and heat transfer in nanofluids.

Further Information

<http://www.physics.niu.edu/inset/>



Ferroelectric domains measured by AFM

In-situ studies of mineral-fluid interfaces and theoretical studies of chemical reaction dynamics and x-ray spectroscopies

Stages for single dimer adsorptions resulting in topological defects in carbon nanotubes

Fabrication on nanochannels for biomolecular microfluidics



Who we are

Argonne National Laboratory conducts basic and applied scientific research across a wide spectrum of disciplines ranging from physics to chemistry to materials science to computation to climatology and biotechnology. Argonne works with universities and federal agencies to advance the forefront of science and technology. Argonne's Center for Nanoscale Materials comprises state-of-the-art characterization and synthesis facilities and is integrated with leading nanoscience programs in the Materials Science, Chemistry, Biotechnology, Chemical Technology and Computation Divisions. Argonne is managed by the University of Chicago for the U.S. Department of Energy's Office of Science. The Advanced Photon Source provides the brightest x-ray beams in the Western Hemisphere to more than 5000 scientists a year, leading to discoveries in disciplines from materials science to biology, chemistry and fundamental physics.

What we do

Pioneering basic research on the nanoscale structure

and dynamics of materials, using top-down lithography and bottom-up self-assembly, scanning probe microscopy, in situ electron, neutron, and x-ray scattering science, thermodynamic and transport measurements, analytical theory and numerical simulation.

Our Research Projects

- Nanocatalytic activity of small clusters and patterned surfaces.
- Nanoscale ferroelectric, magnetic and electronic response.
- Photon confinement and propagation in metallic and dielectric nano-structures.
- Structural and functional behavior of bio-inorganic composites.
- 10 nm x-ray imaging and spectroscopy for structural and functional analysis.
- Electron beam and dual focused ion beam lithography and nano-fabrication.
- Ultra-fast and ultra-sensitive chemical and biological sensors.
- Three-dimensional analytical microscopy with ions, electrons and photons.

- Spin-electronics in confined magnetic nanomaterials.
- Modeling block copolymer interactions with biometric membranes.
- Inelastic x-ray scattering for the study of elastic behavior in materials, and electronic structures in strongly correlated electron systems.
- X-ray micro/nanodiffraction to map domains of long-wavelength modulations of electron spin density.
- Optical pump/x-ray probe experiments on molecular excited states and reaction intermediates.
- Fracture mechanics and stress/strain of composites and biological materials, materials microstructure-properties research including deformation and sintering.

Further Information

<http://www.msd.anl.gov/highlights/>
<http://chemistry.anl.gov/research/>
<http://nano.anl.gov/research/index.html>
<http://www.aps.anl.gov/Science/Highlights/index.html>

- Collaborative Research NIU/ANL
- State of the Art NanoFacilities
- Opportunity to work with leading scientists
- 3-4 year stipend; Up to \$25,000/year (with annual cost of living increase)
- Tuition waiver at NIU (~ \$9,000/year)



Our combined faculty and staff expertise and state-of-the-art instrumentation facilities make our program unique. We will deliver the highest quality graduate education and create scientists and engineers who will lead the new revolution in nanoscience and engineering, encompassing biology, materials science, electronic devices, nanofluids, and medicine.

- Rathindra N. Bose



Rathindra N. Bose
Vice President for Research and Dean of the Graduate School



Clockwise from upper left:
Gabrielle G. Long, Director, X-ray Science Division
George Crabtree, Director, Materials Science Division
Eric Isaacs, Director, Center for Nanoscale Materials
Albert Wagner, Division Director, Chemistry

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Opportunities for Research in Collaborative Programs at Northern Illinois University/Argonne National Laboratory

- Electron Microscopy – probing structure at an atomic scale; nanoscale determination of electronic and magnetic properties.
- Fabrication of nanocrystals with novel shapes; colloidal nanocrystal formation by electrodeposition techniques.
- Studies of ordering of diblock polymers by x-ray scattering; studies of diffusion of nanoparticles by dynamic light and x-ray scattering.
- Theoretical interpretation of core-level spectroscopic measurements of electronic and magnetic structure.
- Exploration of the dynamics and self-assembly of nanoparticles in polymer films and complex fluids by synchrotron x-ray studies.
- Studies of the synthesis of tailor-made hybrid fluids with nanoparticle additives to reduce drag and enhance heat transfer characteristics.
- Development of a Computationally Mediated Experimental Science Collaboratory which permits real-time, virtual, remote computer-control of experiments.



Physics Department, FW
Northern Illinois University
DeKalb, IL 60115

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