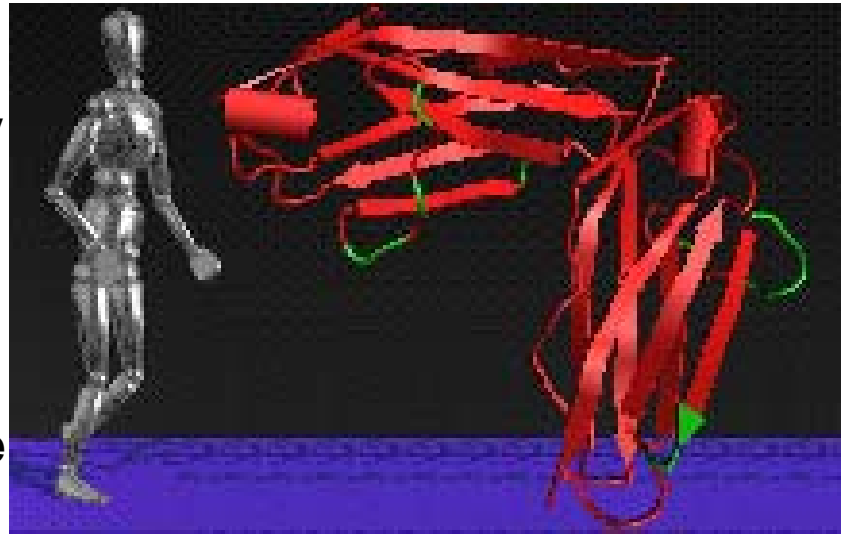
BIOLOGICALLY INSPIRED NANOMATERIALS

NOVEMBER 12-15' 2005, Penn Stater Hotel
http://www.mri.psu.edu/conferences/icam/

The scope of the workshop includes theory, simulation, and experiments involving nanoscale materials inspired by biological systems.



Funding agencies:

- **Institute for Complex Adaptive Matter**
- **Materials Research Institute, Penn State**
- **Portland State University**

ORGANIZERS

Melik Demirel, Penn State
Scott Reed, Portland State
Vincent Crespi, Penn State
Atul Parikh, U.C. Davis

ICAM Today Director: David PINES

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ICAM, a University of California Multi-Campus Research Program with LANL as the Lead UC Campus

UNIVERSITY of CALIFORNIA Riverside
UCSD
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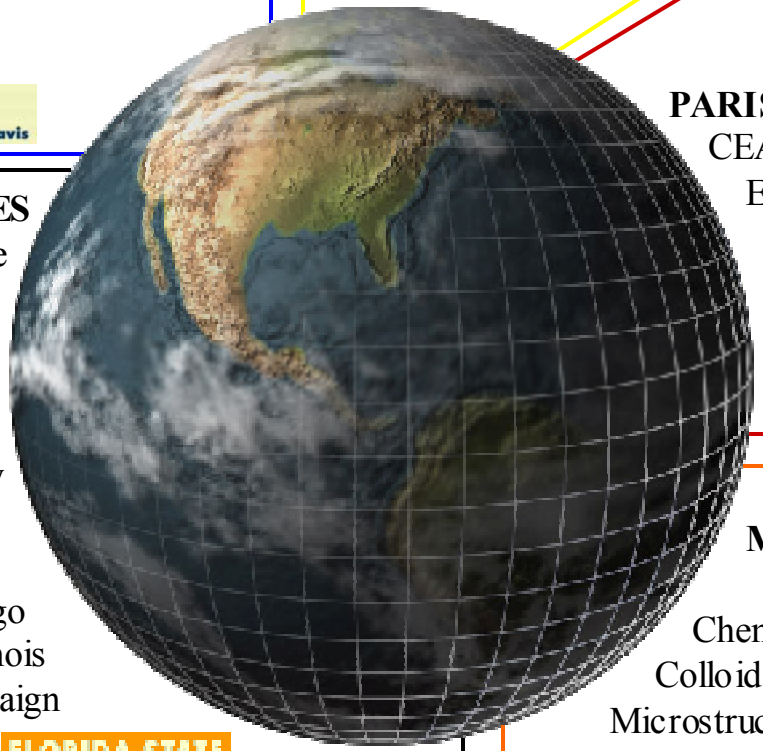

Centre Energie Atomique

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Chemical Physics of Solids, Dresden
Colloids and Interfaces, Potsdam
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Physics of Complex Systems, Dresden
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ICAM Convening Power: Workshop Alumni Affiliations

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Hofstra University
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ICAM Convening Power: Workshop Alumni Affiliations

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- Daresbury Laboratory
- Davy-Faraday Laboratory
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- University College London
- University of Wales-Swansea
- University of Warwick
- University of York

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- CEA/DRFMC/SPSMS
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- Ecole Normale Superieure
- European Synchrotron Radiation Facility
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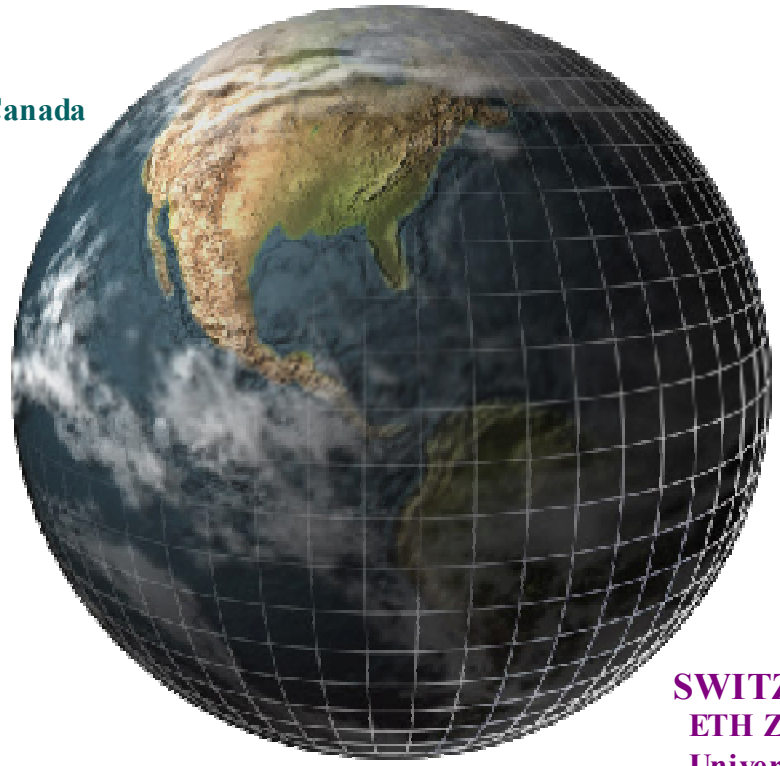
- McMaster University
- National Research Council of Canada
- Universite de Sherbrooke
- University of Alberta
- University of British Columbia
- University of Toronto
- University of Waterloo



GERMANY
- Hamburg University
- Karlsruhe Establishment
- Max-Planck Institute for Solid State
- Universitat Heidelberg
- Universitat Leipzig
- Universitat Muenchen
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INDIA
- Indian Institute of Science

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BIOLOGICALLY INSPIRED NANOMATERIALS

The workshop will address the following questions:

- What has been learned about the molecular interactions between biomolecules and nanomaterials in natural, synthetic and semi-synthetic systems?
- What theoretical and experimental tools are needed to better understand the interface between natural and synthetic nanomaterials?
- How can we better mimic nature's solutions in designing the electronic, optical, and architectural components of nanomaterials?
- How does confinement affect the dynamics of biomolecules in nano-environments?
- Can changes in the structure and function of biomolecules upon binding to nanomaterials be understood? predicted?
- Can we design biologically compatible nanomaterials using inspiration from the natural systems that routinely survive extreme environments?
- How can evolutionary approaches be used in nanomaterial design? How can biologically-inspired adaptive processes be incorporated into nanomaterials design?

BIOLOGICALLY INSPIRED NANOMATERIALS

TODAY-November 12th

All meetings will be held at ROOM 207.

November 12:
17:00-18:00 Opening Session (*Melik Demirel and Scott Reed*) Room 207
17:15-18:15 Keynote lectures

Self Assembly in Living and Synthetic Materials

David L. Allara, Pennsylvania State University, *How we can use molecular self-assembly and molecular interface characterization to model biological systems?*

Uwe B. Sleytr, University of Nat. Resources and Applied Life Sciences, Vienna, Austria, *S-layers as basic buiding block for a molecular construction kit*

19:00- Reception Dinner (Senate Room)

BIOLOGICALLY INSPIRED NANOMATERIALS

TOMORROW, Nov 13th

08:00-9:30 Continental Breakfast (Room 207)

08:30-12:45 Morning Session (Coffee break 10:15-10:45)

Session Chair: Atul Parikh and Scott Reed

Bio-Nano-Interface

Itamar Willner, The Hebrew University of Jerusalem, *Biomolecule-Nanoparticle Hybrids for Sensor and Circuitry Applications*

Vincent M. Rotello, University of Massachusetts, Amherst *Interfacing Nanoparticles with Biomacromolecules*

Mary Elizabeth Williams, Pennslyvania State University, *Molecular Recognition Using Metal Binding Artificial Oligopeptides*

Giacinto Scoles, Princeton University, *What can we learn from the mechanical response of oriented proteins deposited on a metal surface?*

Robert H. Austin, Princeton Univeristy, *Nanoscale structures and biomolecule absorption: taming the beast*

12:30-13:30 Lunch (Garden Restaurant)

13:30-17:30 Afternoon Session (Coffee break 15:15-15:45)

Session Chair: Vincent Crespi and Melik Demirel

Probing Biological Systems using Nanomaterials

Joachim P. Spatz, Max Planck Institute fur Metallforschung, *Biomimetic Studies of Cell Adhesion and Mechanics Applying Nano- and Microscopic Tools*

Weihong Tan, University of Florida, Single *DNA nanomotor for providing energy at the nanometer scale*

Geoffrey F. Strouse, Florida State University, *Optically Probing Biomolecular Structures via Nano Surface Energy Transfer*

Raymond E. Goldstein, University of Arizona, *Motility, Mixing, and Evolutionary Transitions to Multicellularity*

William O. Hancock, Pennsylvania State University, *Integrating kinesin molecular motors into hybrid biological systems*

BIOLOGICALLY INSPIRED NANOMATERIALS

MONDAY, Nov 14th

08:00-9:30 Continental Breakfast (Room 207)

08:30-12:30 Morning Session (Coffee break 10:15-10:45)
Session Chairs: Vincent Crespi and Scott Reed
Patterning with Biological Structures
Paul S. Weiss, Pennsylvania State University, *Creating Nanostructures through Self- and Directed Assembly*
Jayanth R. Banavar, Pennsylvania State University, University *Origami of Life*
James E. Hutchison, University of Oregon, *Organization of 1- and 2-D Nanoparticle Arrays via Assembly of Ligand-stabilized Nanoparticles on Functionalized Biopolymers*
Steven G. Boxer, Stanford, *Tethered vesicle gymnastics*
Mingdi Yan, Portland State Univeristy, *Molecularly Imprinted Materials*
12:30-13:30 Lunch (Garden Restaurant)

13:30-18:00 Afternoon Session (Coffee break 15:15-15:45)
Session Chairs: Atul Parikh and Melik Demirel
Bio-inspired Functional Nanomaterials
Peixuan Guo, Purdue, *Fabrication of Patterned RNA Superstructures for Nanodevice, Gene Delivery and Therapy*
Cristian Micheletti, SISSA, Italy *Coarse grained models for the elasticity of Proteins*
Atul N. Parikh, University of California Davis, *Substrate Effects in Assembly, Structure, and Dynamics of Supported Phospholipid Membranes*
Erin D. Sheets, Pennsylvania State University, *Patterning chemical complexity into biomimetic membranes*
Melik C. Demirel, Pennsylvania State University, *Molecular Forces in Proteins*

19:00 Dinner (Garden Restaurant)

BIOLOGICALLY INSPIRED NANOMATERIALS

Tuesday, Nov 15th

09:00-10:00 Continental Breakfast (Public area in front of Room 207)
09:00-10:50 Poster session
12:00-12:00 Adjourn

Reimbursements:

Rose Romero will be happy to help you

Please provide airline tickets, all other receipts.

Contact me (mdemirel@engr.psu.edu) if you have any questions

THANK YOU

WELCOME…