

Sixth Foresight Conference on Molecular Nanotechnology



sponsored by



13-15 November 1998

12 November Tutorial

Silicon Valley, California

NSF Forum



National Science Foundation
sponsored forum held in
conjunction with the 1998
Sixth Foresight Conference
on Molecular Nanotechnology:
***From Scientific Discovery
to the Nanotechnology
of Tomorrow***

Co-sponsors

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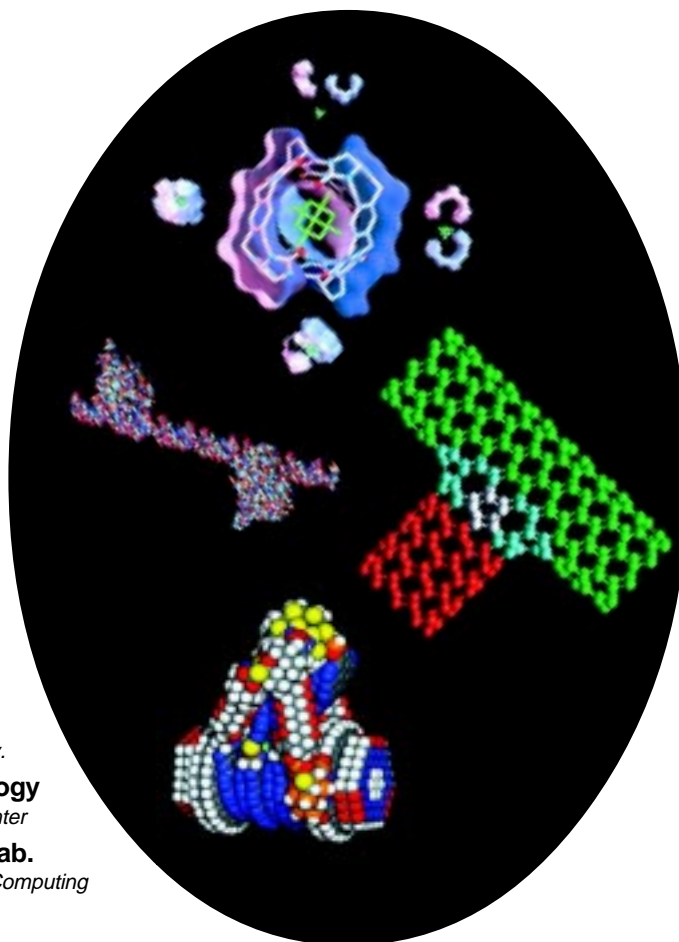
Center for Nanoscale Science and Technology

University of Southern California

Molecular Robotics Laboratory

Washington University

Laboratory for the Study of Novel Carbon Materials



Keynote

Steven Chu
Nobel Prize
Physics 1997

1998
Feynman
Prizes
in
Nanotechnology

**Experimental &
Theoretical**

Introductory
Tutorial

**Critical Enabling
Technologies
for Nanotechnology**

Conference Co-chairs: Al Globus and Dr. Deepak Srivastava, MRJ, NASA Ames

www.foresight.org/conference

inform@foresight.org • 1(650) 917-1122 • fax 1(650) 917-1123

Sixth Foresight Conference on Molecular Nanotechnology

Over the next few decades, manufacturing is expected to undergo a profound change. Advances in miniaturization will reach the level of individual atoms and products will be designed and built to atomically-precise specifications.

This conference is a meeting of scientists and technologists working in fields leading toward molecular nanotechnology: thorough three-dimensional structural control of materials and devices at the molecular level. The conference will cover topics relevant to the pursuit of molecular control, drawing from fields such as:

- molecular electronics
- biochemical molecular engineering
- scanning probe microscopy
- supramolecular chemistry and self-assembly
- computational chemistry and molecular modeling
- computer science
- natural molecular machines
- artificial molecular machines
- materials science
- mechanosynthesis
- mechanical engineering and robotics
- applications

Abstracts

There will be oral presentations and a poster session during the conference. Extended abstracts are due 21 July. Notifications of acceptance will be made by 15 August, and final papers are due 15 October.

Invited speakers

Prof. Steven Chu, Stanford University
1997 Nobel Prize in Physics
Manipulation of Atoms and Bio-Molecules by Laser Light

Prof. Steven M. Block, Princeton University
Using Optical Tweezers to Study Biological Motors

Prof. M. Reza Ghadiri, The Scripps Research Institute
Molecular Self-Assembly, Self-Organization & Self-Replication

Dr. Sumio Iijima, NEC Corporation
Growth of Curved Graphenes

Prof. Mark Reed, Yale University
Molecular Scale Electronic Devices and Systems

Program Committee

Dr. K. Eric Drexler, *Institute for Molecular Manufacturing*

Prof. William A. Goddard III, *Caltech*

Dr. Ralph C. Merkle, *Xerox PARC*

Prof. Nadrian C. Seeman, *New York University*
1995 Feynman Prize Winner

Prof. Richard Smalley, *Rice University*
1996 Nobel Prize in Chemistry

NSF Forum

www.nsf.gov/nano

*A National Science Foundation sponsored forum will be held in conjunction with the 1998 Sixth Foresight Conference on Molecular Nanotechnology on Friday afternoon, November 13, 1998. The forum, entitled **From Scientific Discovery to the Nanotechnology of Tomorrow**, will be moderated by **Prof. M.C. Roco**, NSF Chair of the Interagency Nanotechnology Group and **Prof. Ilhan A. Aksay**, Princeton University. The forum is open to all Foresight Conference attendees and other interested participants at no additional cost.*



NSF Forum speakers include:

Dr. Herb Goronkin, Director of Research, Motorola
From Discoveries to Novel Nanodevices

Prof. Joseph Ballyntyne, Director of the National Nanofabrication Users Network, Cornell University
Nanoscience Research at the Cornell Nanofabrication Facility and its Technological Relevance

Dr. M. Meyyappan, NASA Ames & **Dr. Carl Kukkonen**, JPL
Nanotechnology at NASA

Prof. Hiroshi Komiyama, University of Tokyo
Dynamic Behavior of Nanoparticles in the Initial Stage of Sputtering

Dr. James S. Murday, Naval Research Laboratory
Nanostructures from Science to Technology: Three DOD Case Studies

Prof. Ilhan A. Aksay, Princeton University
Nano and Microscale Patterning of Organic/Inorganic Functional Composites

Dr. Robert Tampe, Max-Planck-Institute for Biochemistry
Self-Assembly & Protein-Engineering Molecular Organization of Biomolecules in Two-Dimensions

1998 Feynman Prizes

The Annual Feynman Prizes will be awarded to this year's most outstanding researchers in theoretical and experimental molecular nanotechnology. An award of \$5000 will be given in each category to the top submission by an individual or team, as selected by the Feynman Prize Committee.

Nominations or submissions consisting of a thesis and/or refereed paper(s) must be made to the Foresight Institute by August 28, 1998. Details are available at www.foresight.org/FI/1998Feynman.html. Last year's winners were James Gimzewski, et.al, from IBM Zurich for experimental work, and Charles Bauschlicher, et. al, from NASA Ames Research Center for theory. Submissions should be mailed to the Foresight Institute.

The Annual Feynman Prizes are distinct from the \$250,000 Feynman Grand Prize. Details on the Grand Prize are available at www.foresight.org/GrandPrize.1.html.

Tutorial on Critical Enabling Technologies for Nanotechnology

Thursday 12 November 1998 • 9 am to 5 pm

The last few years have seen rapid technological advances in atomic scale manipulation. The ability of a variety of computational tools to simulate the energetic, dynamic and electronic properties of atomic systems has also increased considerably. This tutorial will provide an introduction and overview of relevant fields, as well as a consideration of how the advances in each will address the challenges raised by the design of molecular manufacturing systems. Those with science, engineering or software backgrounds are invited to participate and begin preparing for careers in molecular nanotechnology.

Instructors

Dr. Jason P. Cleveland

Scanning Probe Microscopes

Staff Scientist at Digital Instruments. He has made important contributions to AFM hardware development, including magnetic force feedback, and is expert in high performance applications of the AFM such as thermal noise-based force measurements.

Prof. Donald W. Brenner

Analytic Potentials and Molecular Dynamics

Professor of Materials Engineering at North Carolina State University. He is known for formulating reactive many-body hydrocarbon potentials for diamondoid and fullerene based materials, and performing large scale molecular dynamics simulations for problems in chemistry, physics and materials science.

Prof. Joseph A. Zasadzinski

Langmuir-Blodgett Films and Self Assembly

Professor of Chemical Engineering at the University of California, Santa Barbara. He is widely known for his work on mesoscale lipid and surfactant structures, and has studied fundamental aspects of a number of planar and three-dimensional self-assembling systems.

Additional tutorial instructors to be announced.

Space is limited, so early registration is recommended. For any additional information contact the Conference Office at 1(650) 917-1122, inform@foresight.org or Tutorial Chair, Prof. Jan H. Hoh, Department of Physiology, Johns Hopkins University School of Medicine, 1(410) 614-3795 email: Jan.Hoh@jhu.edu

COVER: from top clockwise,

- *A Synthetic Self-Assembling Spherical Complex*
J. Rebek and M. Pique, *The Scripps Research Institute*
- *Nanotube Junctions for Nanoelectronic Devices*
D. Srivastava, MRJ, NASA Ames, and M. Menon,
University of Kentucky, Lexington
- *Molecular Manipulator Design: A Fine Motion Controller*
K. E. Drexler, *Institute for Molecular Manufacturing*
- *Supramolecular Chemistry of Addressable Biostructures*
J. Wendel and S. Smith, *City of Hope Medical Center*

Registration Fees

Registration fee includes the scientific program; Thursday evening reception; Friday, Saturday, Sunday lunch; and a copy of the nanotechnology conference journal. (Student and one-day rates do not include journal.) Amounts over \$150 are tax-deductible in the U.S. as a charitable contribution.

The registration for the tutorial is separate from the conference registration. The tutorial registration fee includes Wednesday lunch. You may register for the conference only, the tutorial only, or both.

Site and Accommodations

The Westin Hotel • Santa Clara, California

5101 Great America Parkway
Santa Clara, CA 95054

Attendees are responsible for making their own reservations by **October 20**. Mention the *Foresight Nanotechnology Conference* to obtain the reduced room rate.

Group Rate: single or double occupancy **\$105** plus tax. (Rooms at this rate are limited; reserve early.)

Reservations: 1(800) 228-3000 or 1(408) 986-0700, Fax 1(408) 980-3990, clara@westin.com, or www.westin.com

Transportation

The conference is convenient to both San Francisco and San Jose airports.

Airport Shuttle Services

South Bay Flyer: Reservations not required. Call from San Jose Airport, 1(888) 463-5937. Vans pick up outside San Francisco Airport. Fares: \$6 from San Jose Airport, \$16 from San Francisco Airport. www.landyacht.com

South & East Bay Shuttle: Reservations not required. White Courtesy Phone in Baggage Claim at San Jose Airport, fare: \$12; Call 1(800) 548-4664 at San Francisco Airport, fare: \$25

Angel Sedans: Private car from the airport; advanced reservations required. 1(800) 982-9004 or 1(650) 742-9004. Mention the Foresight Conference. Fare: \$55 each way from San Francisco, \$45 from San Jose



Refund Policy

Refunds of registration fees can only be made on receipt of a written request, postmarked no later than September 15, 1998 and are subject to a \$100 administrative fee.

Special Needs

Participants with special needs should notify the organizers at least one month in advance.

1998 Sixth Foresight Conference and Tutorial Registration

Registration form available at www.foresight.org/conference

by Sept. 30 after Sept. 30

Please **print** and fax or mail this form to:
Foresight Institute • Box 61058 • Palo Alto CA 94306 USA
Tel: 1(650) 917-1122 • Fax: 1(650) 917-1123

Name: _____

Title: Dr. Ms. Mr. Prof.

Address: _____

City, State: _____

Zip/Postal Code, Country: _____

Phone: _____

Fax: _____

Email: _____

Position (professor, director, programmer, etc.):

Organizational affiliation (for your badge):

How did you hear about this conference:

email web publication: _____

other: _____

Conference Only (13-15 Nov)

Academic, Nonprofit, Govt. \$395 \$495

Corporate, Individual \$495 \$695

Student \$155 \$195

One day Fri Sat Sun \$195 \$295

Tutorial Only (12 Nov) \$395 \$495

\$100 Discount if registering for both Conference and Tutorial

Tutorial \$ _____

Conference \$ _____

TOTAL \$ _____

Please make checks payable to the Foresight Institute. Checks and bank drafts must be in U.S. dollars drawn on a U.S. bank.

VISA or MasterCard Number:

Exp. Date: _____

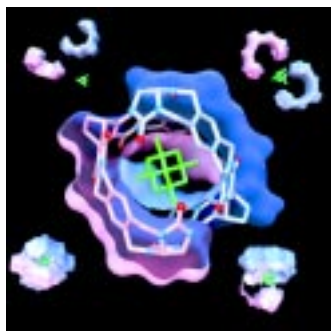
Signature _____

Printed Name _____

Senior Associates of Foresight Institute or IMM may register at the academic rate, regardless of their employment status.



Box 61058
Palo Alto, CA 94306 USA



Synthetic Self-Assembling Spherical Complex by Dr. Julius Rebek, Jr., Director of the Skaggs Institute for Chemical Biology, The Scripps Research Institute, and Michael Pique, The Scripps Research Institute.

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