

7th Foresight Conference on Molecular Nanotechnology



sponsored by



Institute for
Molecular
Manufacturing

October 15-17, 1999

October 14, 1999 Tutorial

Silicon Valley, California

Invited Speakers

Scanning Probes

Eric Henderson, Iowa State Univ.

Jan H. Hoh, Johns Hopkins Univ.

Chad A. Mirkin, Northwestern Univ.

Phil E. Russell, North Carolina State Univ.

Molecular Motors and Biotech

David S. Goodsell, Scripps Research Institute

Michael J. Heller, Nanogen

Joseph Michl, Univ. of Colorado

Carlo Montemagno, Cornell Univ.

Viola Vogel, Univ. of Washington

Nano/Materials and Mechanics & Manipulation

Hongjie Dai, Stanford Univ.

Paul McEuen, UC Berkeley

Rodney S. Ruoff, Washington Univ.

Richard Superfine, Univ. of North Carolina

Molecular Electronics/Self-Assembly

David L. Allara, Pennsylvania State Univ.

Ronald P. Andres, Purdue Univ.

Meyya Meyyappan, NASA Ames

William L. Warren, DARPA/DSO

Theory/Modeling and Computations

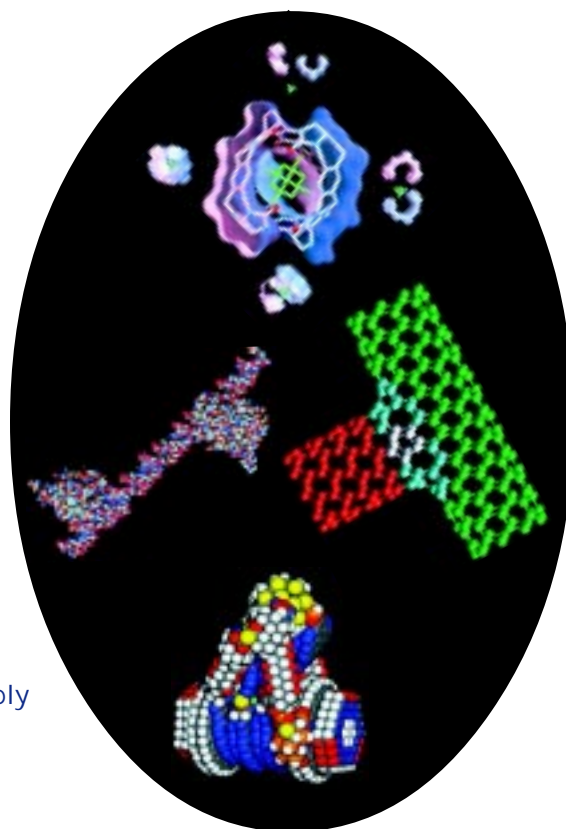
Donald W. Brenner, North Carolina State Univ.

Kyeongjae Cho, Stanford Univ.

Shashi P. Karna, Air Force Research Lab.

Deepak Srivastava, NASA Ames, MRJ

Priya Vashista, Louisiana State Univ.



Abstracts due
June 4, 1999

Keynote

John Polanyi

Nobel Laureate
Chemistry

Introductory Tutorial

Foundations of
Nanotechnology

1999
Feynman Prizes
in
Nanotechnology

Experimental &
Theoretical

Conference Co-chairs: Deepak Srivastava, NASA Ames, MRJ
and Jan H. Hoh, Johns Hopkins University School of Medicine

www.foresight.org/conference

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

7th 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
- theory/modeling and computations
- computer science
- natural and artificial molecular machines
- nanomaterials/mechanosynthesis
- mechanical engineering and robotics
- applications of nanotechnology

Abstracts

There will be oral presentations and a poster session during the conference. The poster session will be held on Friday afternoon. On Saturday there will be additional time for viewing and discussion of the posters. For those who wish to submit papers, the abstracts are due **June 4, 1999**. The abstracts should be no longer than 500 words including references and footnotes. Each submitted abstract may include only **one** graphic in jpg or gif format. The size should be no larger than 3x3 inches (7.5x7.5 cm). Abstracts not in the appropriate format will be returned without being considered.

Submission information is available on the web at www.foresight.org/conference. If you do not have web access, email to inform@foresight.org or fax to Foresight at 1(650) 917-1123. If you have additional questions, contact the conference co-chairs: Deepak Srivastava, deepak@nas.nasa.gov, or Jan Hoh, jan.hoh@jhu.edu.

Journal Special Issue

A journal special issue of papers presented at the conference will be published. The publisher has not been determined; last year's papers were published in a special issue of *Nanotechnology*, a journal published by Institute of Physics. Contributions to the issue are optional and due **October 13, 1999**. All submissions will be peer reviewed. Information about the format and the review process will be sent upon acceptance of an abstract.

Foresight Institute and Institute for Molecular Manufacturing are non-profit organizations focused on nanotechnology education (Foresight) and research (IMM).

1999 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) and supporting documents must be mailed to the Foresight Institute by July 15, 1999. Details are available at www.foresight.org/FI/1999Feynman.html.

Last year's winners for the 1998 Theoretical Feynman Prize in Nanotechnology were **Stephen Walch** (ELORET at NASA Ames Research Center) and **Ralph Merkle** (Xerox Palo Alto Research Center) for their computational modeling of molecular tools for atomically-precise chemical reactions. The 1998 Experimental Feynman Prize was awarded to **M. Reza Ghadiri** of Scripps Research Institute for groundbreaking work in constructing molecular structures through the use of self-organization.

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.

Program Committee

M. Reza Ghadiri, Scripps Research Institute
1998 Feynman Prize Winner - Experimental

James K. Gimzewski, IBM Zurich Research Laboratory
1997 Feynman Prize Winner - Experimental

William A. Goddard III, Caltech

Jan H. Hoh, Johns Hopkins University School of Medicine

Ralph C. Merkle, Xerox PARC
1998 Feynman Prize Winner - Theoretical

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

Richard E. Smalley, Rice University
1996 Nobel Prize in Chemistry

Deepak Srivastava, NASA Ames, MRJ
1997 Feynman Prize Winner - Theoretical

George M. Whitesides, Harvard University



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, NASA Ames, MRJ
M. Menon, University of Kentucky
• *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

Tutorial

Foundations of Nanotechnology

Thursday 14 October 1999 • 9 am to 5 pm

The purpose of this tutorial is to introduce fundamental areas of nanotechnology to newcomers and to strengthen the interdisciplinary knowledge base of seasoned researchers.

Powerful new concepts and capabilities such as atomic-scale imaging and manipulation, self-assembly, and biological structure/function relations together with increasingly powerful computational tools are rapidly converging from disparate research fields to enable a viable molecular nanotechnology. Those with science, engineering or software backgrounds are invited to participate either to begin new careers in nanotechnology, or to expand their expertise into new areas and capabilities.

Topics and Instructors

SCANNED-PROBE MICROSCOPY

Phillip Russell, North Carolina State University

Phillip Russell is a Professor of Materials Science and Engineering and Director of the Analytical Instrumentation Facility at North Carolina State University. He has been an innovator in the development of scanned-probe microscopy techniques, instrumentation and applications. His recent research has emphasized nanomechanics, metrology, self-assembled monolayers and *in situ* studies of nucleation and growth.

NANOSTRUCTURES

Paul McEuen, University of California at Berkeley

Paul McEuen is an Associate Professor in the Berkeley Physics Department and a member of the research staff in the Materials Sciences Division of Lawrence Berkeley National Laboratory. He has been a leader in the characterization of electron transport in nanostructures, especially quantum Hall liquids, superconductors, carbon nanotubes and semiconductor nanocrystals.

COMPUTATIONAL METHODS

Donald Brenner, North Carolina State University

Donald Brenner is an Associate Professor in the Materials Science Department at North Carolina State University. His research interest focuses on the development of analytic interatomic force models and their application to technologically important systems and processes. His recent efforts have included the virtual design, engineering, and testing of nanometer-scale materials and devices.

BIO-NANOTECHNOLOGY: LESSONS FROM NATURE

David S. Goodsell, Scripps Research Institute

David S. Goodsell is Assistant Professor of Molecular Biology at the Scripps Research Institute. His current work focuses on methods for macromolecular docking and rational drug design, in particular the design of resistance-evading inhibitors for HIV protease. Dr. Goodsell has also developed numerous methods for scientific visualization, and has utilized them in materials for scientific outreach and education. His books *The Machinery of Life* and *Our Molecular Nature: the Body's Motors, Machines, and Messages* explore the world of biomolecules within living cells.

Registration Fees

Registration fee includes the scientific program; Thursday evening welcoming reception; Friday, Saturday, Sunday lunch; and a copy of the conference journal issue. For academic and student attendees there is a "no lunch" option that does not include lunch on Friday, Saturday or Sunday. Amounts over \$175 are tax-deductible in the U.S. as a charitable contribution. Student and one-day rates do not include copies of the journal.

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

Tutorial space is limited, therefore early registration is recommended. For additional information, see the web site or contact the Conference Office at 1(650) 917-1122, inform@foresight.org or Tutorial Chair, Prof. Donald W. Brenner, Materials Science and Engineering, North Carolina State University, brenner@eos.ncsu.edu

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 **September 20**. Mention the *Foresight Nanotechnology Conference* to obtain the reduced room rate.

Group Rate: Single or double occupancy **\$115** 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. Check out www.foresight.org/conference/ for more information.

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: \$7 from San Jose Airport, \$16 from San Francisco Airport. www.landyacht.com

Angel Sedans: Private car from the airport; advance reservations required. 1(800) 982-9004 or 1(650) 742-9004. Mention the Foresight Conference. Fares: \$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 August 15, 1999 and are subject to a \$100 administrative fee.

Special Needs

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

1999 7th Foresight Conference and Tutorial Registration

Registration form available at www.foresight.org/conference/MNT7

by Aug. 30 after Aug. 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: _____

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:

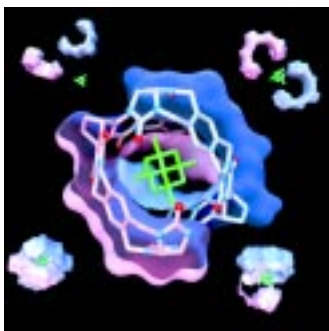
email web publication: _____

other: _____

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.

Conference Only (Oct. 15-17) lunch included

Academic, Nonprofit, Govt.	<input type="checkbox"/>	\$395	<input type="checkbox"/>	\$525
Corporate, Individual	<input type="checkbox"/>	\$495	<input type="checkbox"/>	\$695
Full-time Student**	<input type="checkbox"/>	\$205	<input type="checkbox"/>	\$225

Academic, Nonprofit, Govt. (no lunch)*	<input type="checkbox"/>	\$295	<input type="checkbox"/>	\$425
Student (no lunch)*	<input type="checkbox"/>	\$ 75	<input type="checkbox"/>	\$100
One day <input type="checkbox"/> Fri <input type="checkbox"/> Sat <input type="checkbox"/> Sun	<input type="checkbox"/>	\$175	<input type="checkbox"/>	\$200

Tutorial Only (Oct.14) (w/lunch)	<input type="checkbox"/>	\$395	<input type="checkbox"/>	\$495
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Conference \$ _____

Tutorial \$ _____

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 _____

* No lunch option omits lunch on Friday, Saturday, Sunday.

** Full-time students must provide copy of undergraduate or graduate ID. Journal not included with student and one-day rate.

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