

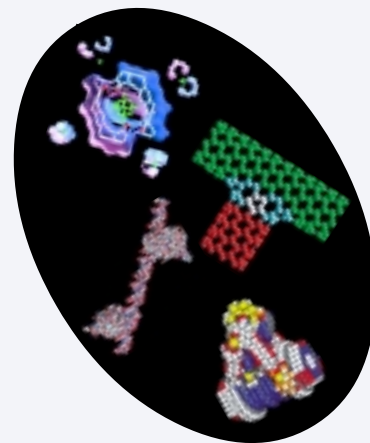


9th Conference on

Molecular Nanotechnology

November 9-11, 2001

Silicon Valley, California



Keynote Speaker: JAMES S. MURDAY

Executive Secretary, Nanometer Science,
Engineering and Technology Committee, NSTC
Chair, Navy Working Group on Nanoscience

*Nanotechnology and the National
Nanotechnology Initiative: A Report Card*

Topics Covered

**Biological Materials • Molecular Electronics • Molecular Machines
Scanning Probes • Self-Assembly • Nanomaterials
Nanostructures • Nanoelectronics and Nanodevices**

Invited Speakers

Robert G. Birge, Univ. of Connecticut and Syracuse Univ.
Protein Based Three-Dimensional and Associative Memories

Vicki L. Colvin, Rice University
Photonic Nanostructures: Using Opals to Organize Materials

Christopher B. Gorman, North Carolina State University
*New Molecules and New Processes to Study
Molecular Electronics Behaviors*

Jie Han, ELORET, NASA Ames Research Center
Molecular Electronics and Chemical/Biological Sensors

Jan Hoh, Johns Hopkins University
*Building Blocks for Biomolecular Devices: Properties and
Possibilities of Unstructured Proteins*

Edwin C. Kan, Cornell University
*Si Fleas: Technology Demonstration of Functional Modules in
Submillimeter Autonomous Microsystems*

Uzi Landman, Georgia Institute of Technology
*Small is Different: Confinement Effects in Quantum Dots,
Nanocatalysis, Wires and DNA*

Charles R. Martin, University of Florida
Templated Nanotubules in Chemical & Bio Separations & Analyses

James T. Spencer, Syracuse University
*Molecular Building Blocks with Applications to
Nonlinear Optical Materials and Nanostructural Assemblies*

Sean Washburn, University of North Carolina
How Does it Feel to Roll a Molecule?

Carter T. White, U.S. Naval Research Laboratory
Carbon Nanotubes: Revolutionary Nanowires with a Twist

R. Stanley Williams, Hewlett-Packard Labs
Nanostructures in Nature and Technology

Stephen R. Wilson, New York University
Fullerene Nanotools from Biology

Register Now

for the World's Premier Conference and Tutorial
on Molecular Nanotechnology

Introductory Tutorial November 8, 2001

Foundations of Nanotechnology

Molecular Electronics

Robert G. Birge, Univ. of Connecticut and Syracuse Univ.

Biological Machines and Materials

Peter G. Gillespie, Oregon Health Sciences University

Nanoscale Materials Chemistry

Christopher B. Gorman, North Carolina State University

Carbon Nanotubes

Jie Han, ELORET, NASA Ames Research Center



Feynman Prize Awards Banquet

Sat. Nov. 10

Annual Foresight Institute
2001 Feynman Prizes
in Nanotechnology

Institute for Molecular Manufacturing:
Prize in Computational Nanotechnology

Nanotechnology Patent Roundtable

Thurs. Nov. 8, Sponsored by Foresight Institute and Foley &
Lardner, Attorneys at Law.

Venture Capital for Nanotechnology

Panel Discussion Fri., Nov. 9

Steve Jurvetson, Draper Fisher Jurvetson

John Ryan, J.P. Morgan Partners

Nicholas Vita, Tuva Capital Partners

Josh Wolfe, Lux Capital

Conference Co-chairs:

Donald W. Brenner, North Carolina State University

Susan B. Sinnott, University of Florida

www.foresight.org/conference

Foresight 9th Conference on Molecular Nanotechnology

Rapid advances in our ability to image, manipulate, and probe the properties of matter at the atomic scale—together with emerging insights into structure, function and self-assembly in biological systems—is bringing to fruition the tremendous promise of nanotechnology first recognized by Richard Feynman over 40 years ago. In the next decade, current research into the science and technology of nanostructures is expected to have a major impact on fields ranging from consumer electronics to space exploration and medicine.

Foresight Institute's 1st Conference on Nanotechnology, which pre-dated the National Nanotechnology Initiative by a decade, was the first comprehensive conference on the topic of nanotechnology. Foresight-sponsored events continue to be the premier venue for discussing new and innovative multidisciplinary research in nanotechnology. Last year's conference, the 8th in the series, attracted over 400 researchers from academic, government and industrial laboratories world-wide, and included papers from the electronics, medical, computing, and biological communities. Foresight's 9th Conference will continue this level of excellence by providing a forum in which leaders from all disciplines delving into science and technology at the nanoscale can present and discuss their most recent results and ideas.

Venture Capital Panel - Fri., Nov. 9, 4:00 pm, during general session

Due to the rapid increase in interest from the venture funding community, there will be a panel discussion on nanotechnology funding featuring venture capital representatives active in nanotechnology.

Nanotechnology Patent Roundtable - Thurs. Nov. 8, 1:00 to 5:00 pm

Sponsored by Foresight Institute and Foley & Lardner, Attorneys at Law, this session is free for conference attendees and \$95 for others. Senior U.S. Patent and Trademark Office officials have been invited to explain the current nanotechnology patent application process and to gather input for improvements from the Roundtable participants and the audience. The Roundtable is designed for members of the nanotechnology community who are involved in patenting their nanotechnology inventions or who are interested in improving the nanotechnology patent process.

Abstracts

There will be oral presentations and a poster session during the conference. The poster session will be held on Friday, Nov. 9, 5:00 pm. On Saturday there will be additional time for viewing and discussion of the posters. Abstracts were due **June 30, 2001**. Poster size will be (4' x 4'). If you have additional questions, contact the conference co-chairs, Don Brenner, brenner@eos.ncsu.edu or Susan Sinnott, ssinn@mse.ufl.edu.

Foresight Institute and Institute for Molecular Manufacturing are non-profit organizations focused on nanotechnology education and research and are funded primarily through Senior Associate donations. Senior Associates receive discounts for all Foresight and IMM sponsored events. For more information about the Senior Associate Program including our annual Gatherings see www.foresight.org/SrAssoc

This conference is sponsored by



Prizes and Awards

2001 Feynman Prizes

The annual Feynman Prizes in Nanotechnology (Experiment and Theory) will be awarded to the person or group whose recent research has made the most significant contribution to the advancement of nanotechnology. An award of \$5,000 will be given in each category to the top submission selected by a prize committee of past winners.

Nominations or submissions were received by **July 31, 2001**. See www.foresight.org/FI/2001Feynman.html

2001 IMM Prizes in Computational Nanotechnology

A new series of prizes will begin at this conference, with the awarding of the first IMM Prizes in Computational Nanotechnology, designed to encourage advances in molecular machine design. See www.imm.org/prizes

2001 Communication Prize

This prize recognizes outstanding journalistic or other communication endeavors that lead to a better public understanding of molecular nanotechnology or other key emerging technologies of high social or environmental impact. See www.foresight.org/FI/communicationprize1.html

2001 Distinguished Student Award

This award is given to the college undergraduate or graduate student whose work is deemed most notable in advancing the development and understanding of nanotechnology. See www.foresight.org/FI/StudentAward4.html

Awards Banquet, Saturday, Nov. 10, 6:30 -8:00 pm

A gala awards banquet on Saturday evening will include presentation of the above prizes and acceptance speeches by the 2001 Feynman Prize winners.

Previous Feynman Prize Winners

2000 Feynman Prize Winners

Experiment — **R. Stanley Williams** and **Philip Kuekes**, Hewlett-Packard Labs and **James Heath**, UCLA

Theory — **Uzi Landman**, Georgia Tech

1999 Feynman Prize Winners

Experiment — **Phaedon Avouris**, IBM

Theory — **William A. Goddard III**, **Tahir Cagin**, and **Yue Qi**, Caltech

1998 Feynman Prize Winners

Experiment — **M. Reza Ghadiri**, Scripps Research Institute

Theory — **Ralph C. Merkle**, Zyvex, LLC, **Stephen Walch**, ELORET NASA Ames

1997 Feynman Prize Winners

Experiment — **James K. Gimzewski**, IBM Zurich Research Laboratory, **Reto Schlittler**, IBM, **Christian Joachim**, CEMES-CNRS

Theory — **NASA/MRJ Team**, NASA Ames

1995 Feynman Prize Winner

Nadrian C. Seeman, New York University

1993 Feynman Prize Winner

Charles Musgrave, Caltech

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



Introductory Tutorial Foundations of Nanotechnology

Thursday, November 8, 2001 • 9 am to 5 pm

The tutorial will serve as an introduction to several important areas in nanotechnology and is ideal for newcomers to the field or experienced researchers who wish to strengthen their interdisciplinary knowledge.

Powerful new concepts and capabilities such as atomic-scale imaging, nanometer-scale structure manipulation, and biological machines, together with increasingly powerful computational capabilities, 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. Topics and Instructors:

Molecular Electronics

Robert G. Birge, *Univ. of Connecticut and Syracuse Univ.*

Robert R. Birge is the Harold S. Schwenk Distinguished Professor at the University of Connecticut and Distinguished Professor and Director of the W.M. Keck Center for Molecular Electronics at Syracuse University. In his research, he seeks to understand the structure and function of visual pigments and light-transducing proton pumps using time-resolved and nonlinear laser spectroscopy, vibrational spectroscopy, low temperature photocalorimetry and site directed mutagenesis. Current work is focused on the goal of using proteins in molecular electronics, optical three-dimensional memories, associative processors and artificial retinas.

Biological Machines and Materials

Peter G. Gillespie, *Oregon Health Sciences University*

Peter Gillespie is an Associate Professor in the Oregon Hearing Research Center with a joint appointment at the Vollum Institute. His research focuses on mechanisms of converting mechanical stimulation (through sound) into electrical signals in the ear. He is particularly interested in biological motors involved in mechanical transduction, and has recently engineered a novel motor protein that can be selectively regulated. He is also an innovator in the area of highly sensitive biochemical detection methods.

Nanoscale Materials Chemistry

Christopher B. Gorman, *North Carolina State University*

Christopher Gorman is an Associate Professor of Chemistry at North Carolina State University. His research interests include synthesis of new molecules for nanosystems, exploration of molecular structure-property relationships for nano-electronics and optics, and use of probe microscopies in exploring single molecule behaviors. His research group is a multidisciplinary collection of people aimed at tackling both basic science and applied aspects of nanometer-scale structures.

Carbon Nanotubes

Jie Han, *ELORET, NASA-Ames Research Center*

Jie Han is a leading research scientist and technical coordinator of the NASA Ames Nanotechnology program, and a co-recipient of the 1997 Feynman Prize in Nanotechnology. He has worked on both computational and experimental nanotechnology with an emphasis on the modeling and fabrication of carbon nanotube based probes, biosensors, and electronic devices. His recent work includes the development of a carbon nanotube based biosensor for cancer detection.

Registration Information

Registration fees include the Thursday evening welcoming reception, scientific program which begins on Friday morning and ends Sunday early afternoon, morning bagels and coffee, coffee breaks, poster session reception and Friday, Saturday, and Sunday lunch. (There is a "no lunch" option that does not include lunch on Friday, Saturday or Sunday — see back page). Also included is the Nanotechnology Patent Roundtable.

Optional items available at this year's conference include the Feynman Prize Banquet Dinner and a Senior Associate Reception. The Banquet Dinner is being held on Saturday, November 10, from 5:30 to 7:30 PM and includes presentation of prizes and acceptance speeches by the 2001 Feynman Prize Winners. The Senior Associate Reception will be held on Saturday, November 10, from 8:00 to 10:00 PM and is open to all conference attendees. See the Registration page for pricing information.

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 the conference and tutorial.

Tutorial space is limited, therefore early registration is recommended. For additional information, see the web site or contact the Conference Office at (650) 917-1122, foresight@foresight.org or James T. Spencer, Dept. of Chemistry, Syracuse University, email: jtsponce@syr.edu

Amounts over \$175 are tax-deductible in the U.S. as a charitable contribution, excluding optional items.

Site and Accommodations

The Westin Hotel • Santa Clara, California • 5101 Great America Parkway • Santa Clara, CA 95054

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

Attendees are responsible for making their own reservations by **Monday, October 15**. Mention the *Foresight Nanotechnology Conference* to obtain the reduced room rate.

Group Rate: Single occupancy **\$120** or double **\$140** plus tax. Rooms at this rate are limited; reserve early.

Location: The Westin Santa Clara is in the heart of Silicon Valley, adjacent to the Santa Clara Convention Center and across from Great America Theme Park, 20 minutes from the San Jose Airport and 40 minutes from the San Francisco Airport. For driving directions or more information go to www.westin.com.

Airport 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, (888) 463-5937. Vans pick up outside San Francisco Airport. See www.land yacht.com.

Refund Policy

Refunds of registration fees can only be made upon receipt of a written request, postmarked no later than August 30, 2001, and are subject to a \$75 administrative fee.

Special Needs

Participants with special needs should notify the organizers at least one month in advance. Please contact the Foresight Institute: email foresight@foresight.org, tel. (650) 917-1122, fax (650) 917-1123.

www.foresight.org/conference

Foresight 9th Conference and Tutorial Registration

Registration form available at www.foresight.org/conference/MNT9

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

Name: _____

Address: _____

City, State: _____

Zip/Postal Code, Country: _____

Phone: _____

Fax: _____

Email: _____

Position (Professor, Director, Programmer, etc.): _____

Organizational affiliation (for your badge): _____

- Yes, include my contact information: name, badge affiliation, and email on an attendee list.**
- No, do not include my contact information on an attendee list.**

Senior Associates of Foresight Institute or IMM may register at the academic rate, regardless of their employment status. For more information about becoming a Senior Associate, see www.foresight.org/SrAssoc.



Box 61058
 Palo Alto, CA 94306 USA



November 9-11, 2001
 9th Foresight Conference on
 Molecular Nanotechnology

Conference Fee with LUNCHES included: (Nov. 9-11)
Conference fees include: Welcome reception, bagels, coffee, poster reception.
 Academic, Nonprofit, Govt., Sr. Assoc. \$595
 Corporate, Individual \$720
 Full-time Student** \$350
 One day Fri Sat Sun \$225

Conference Fee with NO LUNCHES* (Nov. 9-11)
Conference fees include: Welcome reception, bagels, coffee, poster reception.
 Academic, Nonprofit, Govt., Sr. Assoc. \$465
 Corporate, Individual \$590
 Full-time Student** \$195
 *No lunches option omits lunch on Friday, Saturday, Sunday.

Tutorial Fees include lunch (Nov. 8) \$595

I plan to attend the Nanotechnology Patent Roundtable -free to attendees

Optional Items:
 Feynman Prize Banquet \$ 75
 Senior Associate Reception \$ 65
 (Senior Associate membership not required to attend the reception)
 Nanotechnology Patent Roundtable \$95 non conf. attendees

** Full-time students must provide a copy of **current** university student ID with their registration.

| | |
|---|----------|
| Conference | \$ _____ |
| Tutorial | \$ _____ |
| Feynman Prize Banquet | \$ _____ |
| Senior Associate Reception | \$ _____ |
| Nanotechnology Patent Roundtable | \$ _____ |
| TOTAL | \$ _____ |

Please make checks payable to 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 _____

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