CONFERENCE SCHEDULE
Foundations of Nanoscience: Self-Assembled Architectures and Devices (FNANO)

April 21-23, 2004 Snowbird Cliff Lodge, Snowbird, UT

Conference Sponsorship: Defense Advanced Research Projects Agency (DARPA)

FNANO04 Conference Webpage: http://www.cs.duke.edu/~reif/FNANO/FNANO04/

FNANO Conference Chair: John H Reif <johnhreif@duke.edu> Department of Computer Science, Duke University, Durham, NC 919-660-6568

FNANO Conference Program Committee:
Leonard Adleman <adleman@usc.edu>, University of Southern California, Los Angeles, CA
Karl Bohringer <karl@ee.washington.edu>, Department of Electrical Engineering, University of Washington, Seattle, WA
James R. Heath <heath@caltech.edu>, California Institute of Technology, Los Angeles, CA
Michael Hecht <hecht@princeton.edu>, Department of Chemistry, Princeton University, Princeton, NJ
Homme Hellinga <hwh@biochem.duke.edu>, Department of Biochemistry, Duke University, Durham, NC
Philip J. Kuekes <kuekes@hpl.hp.com>, Hewlett-Packard Corporation, Palo Alto, CA
Sri Kumar <skumar@darpa.mil>, Information Processing Technology Office (IPTO), Defense Advanced Research Projects Agency (DARPA), Arlington, VI
Kwan Kwok <kkwok@darpa.mil>, Microsystems Technology Office (MTO), Defense Advanced Research Projects Agency (DARPA), Arlington, VI
Jie Liu <j.liu@duke.edu>, Department of Chemistry, Duke University, Durham, NC
John H. Reif <johnhreif@duke.edu> (Chair), Department of Computer Science, Duke University, Durham, NC
George C. Schatz <schatz@chem.northwestern.edu>, Department of Chemistry, Northwestern University, Evanston, IL
Nadrian Seeman <ncs1@feynman.acf.nyu.edu>, Department of Chemistry, New York University, New York, NY
Lloyd Smith <smith@chem.wisc.edu>, University of Wisconsin, Madison, WI
Andrew Turberfield <a.turberfield@physics.ox.ac.uk>, Department of Physics, Oxford University, Oxford UK

file:///Users/johnreif/Desktop/FNANOschedules/FNANO04schedule.html
R. Stanley Williams <stan_williams@hp.com>, Hewlett-Packard Corporation, Palo Alto, CA

Conference Reception: Golden Cliff Room (7:00 PM-9:00 PM April 20)

Conference Schedule Wednesday, April 21, 2004

Continental Breakfast: Outside Ballroom 1 (7:30 AM-8:00 AM April 21)

Opening of FNANO Conference & Announcements: Ballroom 1 (8:00 AM-8:05 AM April 21)
John H. Reif, Conference Chair

FNANO Track on Self-Assembled DNA Nanostructures, Session A: Ballroom 1 (8:05 AM - 9:25 AM April 21)

Track Chair: Nadrian Seeman <ncs1@feynman.acf.nyu.edu>, Department of Chemistry, New York University, New York, NY

4 Invited Talks:

- Building Blocks for DNA Self-Assembly (8:05 AM-8:25 AM)
  Yuriy Brun <ybrun@usc.edu>, Laboratory for Molecular Science, University of Southern California. Los Angeles, CA

- Self-Assembly of Nanoparticle Arrays by DNA Scaffolding (8:25 AM-8:45 AM)
  Richard A. Kiehl <kiehl001@umn.edu>, University of Minnesota-Twin Cities, Minneapolis, MN

- Hierarchical and Serial DNA Self-Assemblies (8:45 AM-9:05 AM)
  Thom LaBean <thl@cs.duke.edu>, Department of Computer Science, Duke University, Durham, NC

- Self-assembly of DNA triangles (9:05 AM-9:25 AM)
  Chengde Mao <mao@purdue.edu>, Department of Chemistry, Purdue University, West Lafayette, IN

Refreshment Break: Outside Ballroom 1 (9:25 AM-9:35 AM April 21)
FNANO Track on Self-Assembled DNA Nanostructures, Session B: Ballroom 1 (9:35 AM - 10:55 AM April 21)

Track Chair: Nadrian Seeman

4 Invited Talks:

- DNA-mediated nano-hybrid-materials (9:35 AM - 9:55 AM)
  Wolfgang Parak <wolfgang.parak@physik.uni-muenchen.de>, Ludwig Maximilians Universitaet Muenchen, Muenchen, Germany

- DNA Sierpinski Triangles and DNA nanotubes (9:55 AM - 10:15 AM)
  Paul Rothemund <pwkr@dna.caltech.edu>, California Institute of Technology, Los Angeles, CA

- An aptamer-based DNA nanomachine (10:15 AM - 10:35 AM)
  Friedrich Simmel <friedrich.simmel@physik.uni-muenchen.de>, Munich University, Muenchen, Germany

- A Clonable DNA Nano-Octahedron (10:35 AM - 10:55 AM)
  William M. Shih <wmshih@scripps.edu>, Department of Chemistry, The Scripps Research Institute, La Jolla, CA

Refreshment Break: Outside Ballroom 1 (10:55 AM-11:05 AM April 21)

FNANO Track on Principles and Theory of Self-Assembly, Session A: Ballroom 1 (11:05 AM –12:25 PM April 21)
Track Chair: Leonard Adleman <adleman@usc.edu>, Laboratory for Molecular Science, University of Southern California. Los Angeles, CA

4 Invited Talks:

- Phase Transitions and Control in Self Assembly (11:05 AM –11:25 PM)
  Ed Coffman <egc@ee.columbia.edu>, Department of Computer Science, Columbia University, NY City, NY

- Self assembling by DNA junction molecules: the theoretical model (11:25 AM –11:45 PM)
  Natasha Jonoska <jonoska@math.usf.edu>, Department of Mathematics, University of Southern Florida, Tampa FL

- Directed Self-Assembly Using Graph Grammars (11:45 AM –12:05 PM)
  Eric Klavins <klavins@ee.washington.edu>, Dept of Electrical Engineering, University of Washington, Seattle, WA

- Flux systems, flows and self-assembly (12:05 PM –12:25 PM)
Grzegorz Rozenberg <rozenber@liacs.nl>, Leiden Institute for Advanced Computer Science, Leiden University, Leiden, The Netherlands

Lunch: Golden Cliff Room (12:25 PM-1:10 PM April 21)

Principles and Theory of Self-Assembly Track Chair Overview Talk: Golden Cliff Room:
- Toward a general theory of Self-assembly (12:35 PM-1:05 PM)
Leonard Adleman <adleman@usc.edu>, Laboratory for Molecular Science, University of Southern California. Los Angeles, CA

FNANO Track on Principles and Theory of Self-Assembly, Session B: Error Correction: Ballroom 1 (1:10 PM -2:10 PM April 21)
Track Chair: Leonard Adleman

3 Invited Talks:
- Errors and Error-correction in Algorithmic Self-Assembly (1:10 PM-1:30 PM)
Erik Winfree <winfree@caltech.edu>, Department of Computer Science, and Department of Computation and Neural Systems, California Institute of Technology, Pasadena, CA

- Optimal Self-Assembly of Counters at Temperature Two (1:30 PM-1:50 PM)
Ashish Goel <ashishg@stanford.edu> (speaker), Qi Cheng and Pablo Moisset de Espanes, Department of Management Science and Engineering, Stanford University, Stanford CA

- Compact Error-Resilient Computational DNA Tiling Assemblies (1:50 PM-2:10 PM)
John H. Reif <reif@cs.duke.edu>, Sudheer Sahu <sudheer@cs.duke.edu> (speaker) and Peng Yin <py@cs.duke.edu>, Department of Computer Science, Duke University, Durham, NC

Refreshment Break: Outside Ballroom 1 (2:10 PM –2:20 PM April 21)

FNANO Track on DNA-Metal Aggregates, Session A: Ballroom 1 (2:20 PM –3:40 PM April 21)
Track Chair: George C. Schatz <schatz@chem.northwestern.edu>, Department of Chemistry, Northwestern University, Evanston IL

4 Invited Talks:
- DNA directed assembly of nanocrystals (2:20 PM –2:40 PM)
  Yi Cui <ycui@uclink.berkeley.edu> (speaker) and Paul Alivisatos <alivis@uclink4.berkeley.edu>, University of California, Berkeley, CA

- Nanopearls: A new synthesis for programmably creating Biochemical-Nanoparticle linear sequences and applications (2:40 PM –3:00 PM)
  Joe Jacobson <jacobson@media.mit.edu>, Media Lab, MIT, Cambridge, MA (with Shuguang Zhang <shuguang@mit.edu>, Center for Biomedical Engineering)

- DNAzyme-Directed Assembly of Nanoparticles and its Application as Colorimetric Sensors for a Broad Range of Analytes (3:00 PM –3:20 PM)
  Yi Lu <yi-lu@uiuc.edu>, Department of Chemistry, University of Illinois at Urbana-Champaign, Urbana, IL

- Self-Assembly Driven Metallization of DNA-Templated Nanowires (3:20 PM –3:40 PM)
  Oliver Harnack <harnack@sony.de>, Materials Science Laboratories, Sony International (Europe) GmbH, Stuttgart, Germany

Refreshment Break: Outside Ballroom 1 (3:40 PM –3:50 PM April 21)

FNANO Track on DNA-Metal Aggregates, Session B: Ballroom 1 (3:50 PM - 4:50 PM April 21)
Track Chair: George C. Schatz <schatz@chem.northwestern.edu>, Department of Chemistry, Northwestern University, Evanston IL

3 Invited Talks:

- DNA-based fabrication of metallic wires and networks (3:50 PM - 4:10 PM)
  Michael Mertig <mertig@tmfs.mpgf.k.tu-dresden.de>, Institut für Werkstoffwissenschaft, Technische Universität Dresden, Dresden, Germany

- Polymer-Gold Aggregates (4:10 PM - 4:30 PM)
  Sungho Park <spark72@chem.northwestern.edu>, Department of Chemistry, Northwestern University, Evanston IL

- Transistor in a Test Tube - Harnessing Molecular Biology to the Self-Assembly of Functional Electronics (4:30 PM - 4:50 PM)
  Uri Sivan <phsivan@tx.technion.ac.il>, Department of Physics, Technion, Haifa, Israel
Refreshment Break: Outside Ballroom 1 (4:50 PM –5:00 PM April 21)

FNANO Track on Molecular Electronic & Quantum Devices, Session A: Ballroom 1 (5:00 PM-6:00 PM April 21)
James R. Heath <heath@caltech.edu>, California Institute of Technology, Los Angeles, CA and
Kwan Kwok <kkwok@darpa.mil>, Microsystems Technology Office (MTO), Defense Advanced Research Projects Agency (DARPA), Arlington, VI

3 Invited Talks:
- Carbon Nanotube Electronics (5:00 PM-5:20 PM)
  Hongjie Dai <hdai1@stanford.edu> (speaker) and Ali Javey, Department of Chemistry, Stanford University, Stanford, CA

- STM spectroscopy on free-standing carbon nanotubes (5:20 PM-5:40 PM)
  Cees Dekker <dekker@mb.tn.tudelft.nl>, Delft University of Technology, Department of Applied Physics, The Netherlands

- Four Unimolecular Rectifiers and What Lies Ahead (5:40 PM-6:00 PM)
  R. Metzger <rmetzger@bama.ua.edu>, Chemistry Department, University of Alabama, Tuscaloosa, AL

Reception: Golden Cliff Room (6:00 PM-6:30 PM April 21)

Dinner Buffet: Golden Cliff Room (6:45 PM-8:00 PM April 21)

Self-Assembled DNA Nanostructures Track Chair Overview Talk: Golden Cliff Room
- Not Just the Secret of Life (7:00 PM-7:30 PM)
  Nadrian Seeman <ncs1@feynman.acf.nyu.edu>, Department of Chemistry, New York University, New York, NY

DNA-Metal Aggregates Track Chair Overview Talk: Golden Cliff Room
- Cooperative DNA Melting in DNA Linked Gold Nanoparticle Aggregates (7:30 PM-8:00 PM)
  George C. Schatz <schatz@chem.northwestern.edu>, Department of Chemistry, Northwestern University, Evanston IL (paper by Hai Long, Maodu Chen, and George C.
  Schatz)

NSF Workshop on Self-Assembled Architectures,
Evening Session A: Solicitation of Ideas for New Research Challenges  
Golden Cliff Room (8:00 PM-9:00 PM April 21)

coChairs: John H. Reif <johnhreif@duke.edu>, Duke University and 
K. Birgitta Whaley <whaley@socrates.berkeley.edu>, Department of Chemistry, University of California, Berkeley, CA

Greetings & Overview: John H. Reif (8:00 PM-8:05 PM)

Dessert (8:05 –8:30 PM)

Open Session on Proposals for New Research Challenges in Self-Assembled Nanostructures Led by NSF Workshop Panel (8:05 PM-9:30)

Conference Schedule Thursday, April 22, 2004

Continental Breakfast: Outside Ballroom 1 (7:30 AM - 8:00 AM April 22)

FNANO Track on Molecular Electronic & Quantum Devices, Session B: Ballroom 1 (8:00 AM- 11:15 AM April 22) 
Track coChairs:
James R. Heath <heath@caltech.edu>, California Institute of Technology, Los Angeles, CA and 
Kwan Kwok <kwok@darpa.mil>, Microsystems Technology Office (MTO), Defense Advanced Research Projects Agency (DARPA), Arlington, VI

9 Invited Talks:

- Hybrid Semiconductor/Molecular Devices (8:00 AM- 8:20 AM)  
  David Bocian <david.bocian@ucr.edu>, University of California at Riverside, Riverside, CA

- Polymer Nanofiber Based Devices (8:20 AM- 8:40 AM)  
  Harold G. Craighead <hgc1@cornell.edu>, Cornell University, Ithaca, NY

- Building Block Approaches to Molecular Nanomagnets (8:40 AM- 9:00 AM)  
  Kim Dunbar <dunbar@mail.chem.tamu.edu>, Dept. of Chemistry, Texas A&M University, College Station, TX
- Silicon contacts: A new playground for molecular electronics? (9:00 AM - 9:20 AM)
  Avik Ghosh <ghosha@ecn.purdue.edu>, School of Electrical and Computer Engineering, Purdue University, West Lafayette, IN

- Self-Assembly and Lithographic Patterning of DNA Rafts (9:20 AM - 9:40 AM)
  Marya Lieberman <mlieberm@nd.edu>, Department of Chemistry and Biochemistry, University of Notre Dame, Notre Dame, IN

Refreshment Break: Outside Ballroom 1 (9:40 AM - 9:55 AM April 22)

- In-wire Molecular Electronic Devices: Synthesis and Electrical Characterization (9:55 AM - 10:15 AM)
  Theresa Mayer <tsm2@psu.edu>, Pennsylvania State University, University Park, PA

- Molecular Meccano and Molecular Electronics (10:15 AM - 10:35 AM)
  Fraser Stoddart <stoddart@chem.ucla.edu>, UCLA & California NanoSystems Institute (CNSI), Los Angeles, CA

- Synthesis and Self-Assembly of Nanostructures (10:35 AM - 10:55 AM)
  Younan Xia <xia@chem.washington.edu>, Department of Chemistry, University of Washington, Seattle, WA

- Design of Magnetic Spinel Ferrite Nanoparticles for Biological Applications (10:55 AM - 11:15 AM)
  John Zhang <john.zhang@chemistry.gatech.edu>, School of Chemistry & Biochemistry, Georgia Institute of Technology, Atlanta, GA

Refreshment Break: Outside Ballroom 1 (11:15 AM - 11:30 AM April 22)

FNANO Track on Molecular Electronics & Quantum Devices, Session C: Ballroom 1 (11:10 AM - 12:30 PM April 22)
Track coChairs: James R. Heath and Kwan Kwok

3 Invited Talks:

- Some Issues of Junction Dynamics (11:30 AM - 11:50 AM)
  Mark Ratner <ratner@chem.northwestern.edu>, Chemistry Department, Northwestern University, Evanston Il
- Tunneling Spectroscopy of Self-Assembled Monolayers (11:50 AM - 12:10 PM)
  Mark Reed <mark.reed@yale.edu>, Department of Electrical Engineering, Yale University, New Haven, CT

- Molecular Electronics: NanoCell Electronic Memories and Direct Covalent Attachment of Molecules to Oxide-Free Silicon for Construction of Hybrid Devices (12:10 PM - 12:30 PM)
  James Tour <tour@rice.edu>, Department of Chemistry, Rice University, Houston, TX

Lunch: Golden Cliff Room (12:30 PM -1:20 PM April 22)

Molecular Electronic & Quantum Devices Track Chair Overview Talk: Golden Cliff Room
Molecular Mechanics & Electronics (12:40 PM - 1:10 PM)
James R. Heath <heath@caltech.edu>, California Institute of Technology, Los Angeles, CA

FNANO Track on Molecular Electronics & Quantum Devices, Session D: Quantum Computing Devices: Ballroom 1 (1:20 PM - 2:20 PM April 22)
Track coChairs: James R. Heath and Kwan Kwok

3 Invited Talks:

- Molecular Wiring of Semiconductor Nanostructures for Quantum Information Processing (1:20 PM - 1:40 PM)
  David Awschalom <awsch@physics.ucsb.edu> and Min Ouyang <ouyang@iquest.ucsb.edu> (speaker), Department of Physics, University of California, Santa Barbara, CA

- Molecular Quantum-dot Cellular Automata (1:40 PM - 2:00 PM)
  Craig Lent <lent@nd.edu>, Department of Electrical Engineering, University of Notre Dame, Notre Dame, IN

- Quantum Computation with Endohedral Fullerenes (2:00 PM - 2:20 PM)
  Jason Twamley <Jason.Twamley@may.ie>, Department of Mathematical Physics, National University of Ireland Maynooth, Kildare, Ireland

Refreshment Break: Outside Ballroom 1 (2:20 PM - 2:30 AM April 22)

FNANO Track on Peptide and Viral Self-Assembly: Ballroom 1 (2:30 PM - 4:30 PM April 22)
Track Chair: Michael Hecht <hecht@princeton.edu>, Department of Chemistry, Princeton University, Princeton, NJ

6 Invited Talks:

- Virus-Based Genetic Toolkit for the Directed Synthesis of Magnetic and Semiconducting Nanowires (2:30 PM - 2:50 PM)
  Angela Belcher <belcher@mit.edu>, MIT, Cambridge, MA

- Chemical and Genetic Tailoring of Virus Particles to Achieve Nanochemical Function (2:50 PM - 3:10 PM)
  M.G Finn <mgfinn@scripps.edu>, Department of Chemistry and The Skaggs Institute for Chemical Biology, Scripps Research Institute, La Jolla, CA

- Self-Assembled Viruses as Nanocontainers (3:10 PM - 3:30 PM)
  William Gelbart <gelbart@chem.ucla.edu>, Department of Chemistry, UCLA, Los Angeles, CA

- Assembly and Functionization of an Icosahedral Virus (3:30 PM - 3:50 PM)
  Tianwei Lin <twlin@scripps.edu>, Scripps Institute, La Jolla, CA - Tianwei Lin <twlin@scripps.edu>, Scripps Institute, La Jolla, CA

- Peptide and Biomimetic Catalysts for Structure-Directed Nanofabrication of Siloxanes, Organometallics and Metallo-oxanes (3:50 PM - 4:10 PM)
  Daniel Morse <d_morse@lifesci.ucsb.edu>, Department of Molecular, Cellular and Developmental Biology, UC Santa Barbara, Santa Barbara, CA

- Molecular Biometics: Building Materials via the Natures's Way, One Molecule at a Time (4:10 PM - 4:30 PM)
  Mehmet Sarikaya <sarikaya@u.washington.edu>, University of Washington, Seattle, WA

Refreshment Break: Outside Ballroom 1 (4:30 PM-4:40 PM April 22)

FNANO Track on Molecular Motors, Session A: Ballroom 1 (4:40 PM-6:00 PM April 22)
Track Chair: Andrew Turberfield <a.turberfield@physics.ox.ac.uk>, Department of Physics, Oxford University, Oxford UK

4 Invited Talks:
- Rotaxane- and Catenane-based Molecular Machines and Motors (4:40 PM-5:00 PM)
  Alberto Credi <acredi@ciam.unibo.it>, Department of Chemistry, University of Bologna, Italy

- Artificial Surface-Mounted Molecular Rotors (5:00 PM-5:20 PM)
  Josef Michl <michl@eefus.colorado.edu>, Department of Chemistry and Biochemistry, University of Colorado, Boulder, CO

- DNA Nanoactuator in Self-assembly (5:20 PM-5:40 PM)
  Hao Yan <hy1@cs.duke.edu>, Department of Computer Science, Duke University, Durham, NC

- Autonomous DNA Motors and Computing Machines: Experimental Study and Theoretical Constructions (5:40 PM-6:00 PM)
  Peng Yin <py@cs.duke.edu> (speaker), Andrew Turberfield <a.turberfield@physics.ox.ac.uk>, Department of Physics, Oxford University, Oxford UK, Hao Yan <hy1@cs.duke.edu>, John H. Reif <>, Department of Computer Science, Duke University, Durham, NC

Conference Schedule Thursday Evening, April 22, 2004

Reception & Poster Session: Golden Cliff Room (6:00 PM -6:45 PM April 22)

16 Posters:

DNA Computation Times
  Yuliy Baryshnikov <ymb@research.bell-labs.com>, Bell Labs, Lucent Technologies, Murray Hill, NJ

Assembly and electrical properties of nanomaterials
  Sung-Wook Chung <schung@chem.northwestern.edu>, Department of Chemistry & Institute for Nanotechnology, Northwestern University, Evanston, IL

Parallel Computer Architectures Enabled by Self-Assembly
  Chris Dwyer <dwyer@ece.duke.edu>, Department of Computer Science, Duke University, Durham, NC

Redox-Controllable Shuttling in Bistable [2]Rotaxanes
  Alberto Di Fabio <adifabio@ciam.unibo.it>, Department of Chemistry, University of Bologna, Bologna, Italy
Atomic Force Microscopy Movies and Measurements of DNA Crystals  
Rizal F. Hariadi <hariadi@dna.caltech.edu>, Department of Computer Science, and Department of Computation and Neural Systems, California Institute of Technology, Pasadena, CA

CAD Support for DNA-Guided Self-Assembly of Nanoelectronics  
Vijeta Johri <vijeta@cs.duke.edu>, Department of Computer Science, Duke University, Durham, NC

Active and Dynamic Nanomaterials Using Kinesin and Microtubules  
Steven John Koch <sjkoch@sandia.gov>, Biomolecular Materials and Interfaces, Sandia National Laboratories, Albuquerque, NM

Paradigms for computational nucleic acid design  
Robert M. Dirks <dirks@caltech.edu>, Milo Lin <milo@dna.caltech.edu>, Erik Winfree <winfree@caltech.edu>, and Niles A. Pierce <niles@caltech.edu>, Applied & Computational Mathematics, California Institute of Technology, Pasadena, CA

Effect of Corrugating Schemes on the Morphologies of DNA Lattices  
Sung Ha Park <spark@phy.duke.edu>, Department of Physics, Duke University, Durham, NC

NANA: Nano-scale Active Network Architecture  
Jaidev Patwardhan <jaidev@cs.duke.edu>, Department of Computer Science, Duke University, Durham, NC

Patterning of DNA using molecular liftoff methodology  
Koshala Sarveswaran <ksarvesw@nd.edu>, Department of Chemistry and Biochemistry, University of Notre Dame, Notre Dame, IN

DNA Hybridization Catalysts and Catalyst Circuits  
Georg Seelig <seelig@dna.caltech.edu>, California Institute of Technology, Pasadena, CA

Efficient Algorithms for Multistranded Stochastic Kinetic Simulation  
Joseph Schaeffer <schaeffer@dna.caltech.edu>, Department of Computer Science, and Department of Computation and Neural Systems, California Institute of Technology, Pasadena, CA

Rewritable memory by controllable nanopatterning of DNA  
Jong-Shik Shin <enzymo@acm.caltech.edu> and Niles A. Pierce, <niles@caltech.edu>, Applied & Computational Mathematics, California Institute of Technology, Pasadena, CA

Immobilization of DNAzymes for Sensitive Pb2+ Sensors  
Daryl P. Wernette <dwernett@uiuc.edu>, Juewen Liu and Yi Lu, University of Illinois - Urbana Champaign, Urbana, IL

Spin-Dependent Transport in Nanoscale Systems
Executive Meeting for Track Chairs: (6:00 PM -6:45 PM April 22)
Agenda: Discussion of plans for future years & Topics for NSF Programs in Self-Assembled Nanostructures

Dinner: Golden Cliff Room (6:45 PM -8:00 PM April 22)
Peptide and Viral Self-Assembly Track Chair Overview Talk: Golden Cliff Room
- Structures and Functions of De Novo Proteins from Designed Combinatorial Libraries (7:00 PM-7:30 PM)
Michael Hecht <hecht@princeton.edu> Department of Chemistry, Princeton University, Princeton, NJ
Nanomachines made from DNA (7:30 PM – 8:00 PM)
Andrew Turberfield <a.turberfield@physics.ox.ac.uk>, Department of Physics, Oxford University, Oxford UK

NSF Workshop on Self-Assembled Architectures,
Evening Session B: Overviews of Study Group Reports
Golden Cliff Room (8:00 PM-9:00 PM April 22)
coChairs: John H. Reif <>, Duke University and K. Birgitta Whaley <whaley@socrates.berkeley.edu>, Department of Chemistry, University of California, Berkeley, CA
Greetings & Overview: John H. Reif
Golden Cliff Room (8:00 PM-8:05 PM April 21)
Dessert (8:05 PM-8:30 PM April 22)
Overviews by Track Chairs of Study Group Reports on Topics for New Research Challenges in Self-Assembled Nanostructures:
Golden Cliff Room (8:05 PM-9:00 PM)
Each Track Chair will give a 5-minute presentation of New Research Challenges in their Track area:
-Principles and Theory of Self-Assembly (Leonard Adleman)
-Molecular Self-Assembly (Nadrian Seeman)
-Self-Assembled Molecular Electronic Quantum Devices (James R. Heath)
-Self-Assembled Molecular Electronics & Quantum Architectures (Philip J. Kuekes & R. Stanley Williams)
Foundations of Nanoscience SCHEDULE

- Self-Assembled Fullerene Nanostructures (Jie Liu)
- Conformal, Magnetic, Electrostatic & Hydrophobic-Hydrophilic Self-Assembly (Karl Bohringer)
- Self-Assembled DNA-Metal Aggregates (George C. Schatz)
- Self-Assembled Surface Chemistry (Lloyd Smith)
- Peptide and Viral Self-Assembly (Michael Hecht)
- Self-Assembled Autonomous Molecular Devices (Andrew Turberfield)
- Self-Assembled Molecular Sensors (Homme Hellinga)

Round-Table Discussion by Program Managers of Existing Funding Programs & Proposed Plans for New Funding Programs
Golden Cliff Room (9:00 PM-9:30 PM April 22)

Sri Kumar <skumar@darpa.mil>, Information Processing Technology Office (IPTO), Defense Advanced Research Projects Agency (DARPA), Arlington, VI and
Mitra Basu <mbasu@nsf.gov>, Division of Computing and Communication Foundations, Directorate for Computer and Information Science and Engineering (CISE), National Science Foundation (NSF), Arlington, VI
- Steven Ho <sho@darpa.mil>, Defense Sciences Office (DSO), Defense Advanced Research Projects Agency (DARPA), Arlington, VI
- Kwan Kwok <kkwok@darpa.mil> Microsystems Technology Office (MTO), Defense Advanced Research Projects Agency (DARPA), Arlington, VI
- Thomas Renz <thomas.renz@rl.af.mil>, Information Directorate, Air Force Rome Labs (AFRL), Rome, NY
- Nikzad (Benny) Toomarian <nikzad.toomarian@jpl.nasa.gov>, Bio-Nano Technology Office, Life Detection Science & Technology Program, NASA Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA

Conference Schedule Friday, April 23, 2004

Continental Breakfast: Outside Ballroom 1 (7:00 AM -7:30 AM April 23)

FNANO Track on Molecular Motors, Session B: Ballroom 1 (7:30 AM - 8:10 AM April 23)
Track Chair: Andrew Turberfield <a.turberfield@physics.ox.ac.uk>, Department of Physics, Oxford University, Oxford UK

2 Invited Talks:
- Nanodevices integrating biomolecular motors (7:30 AM - 7:50 AM)
  Henry Hess <hhess@u.washington.edu>, Department of Bioengineering, University of Washington, Seattle, WA
- Construction of micro belt conveyers: two approaches (7:50 AM - 8:10 AM)
  **Taro Uyeda** <t-uyeda@aist.go.jp>, Gene Function Research Center, Tsukuba Central, Ibaraki, Japan

---

**FNANO Track on Molecular Sensors (8:10 AM - 9:40 AM April 23)**

Track Chair: **Homme Hellinga** <hwh@biochem.duke.edu>, Department of Biochemistry, Duke University, Durham, NC

**Track Chair Overview Talk:**
- Computational design of protein-based biosensors (8:10 AM -8:40 AM)
  **Homme Hellinga**

3 Invited Talks:

- Massive Self-Assembly of Carbon Nanotube-Based Integrated Sensor Structures (8:40 AM -9:00 AM)
  **Seunghun Hong** <shong@phy.fsu.edu>, Department of Physics, Florida State University

- Nanodevices based on linear protein molecular motors: Challenges and opportunities (9:00 AM -9:20 AM)
  **Dan Nicolau** <dnicolau@swin.edu.au>, Swinburne Industrial Research Institute, Swinburne University of Technology, Swinburne, Australia

- S-layers as patterning elements for supramolecular structures (9:20 AM -9:40 AM)
  **Dietmar Pum** <dietmar.pum@boku.ac.at>(speaker) and **Uwe Bernd Sleytr** <uwe.sleytr@boku.ac.at>, Center for Ultrastructure Research, University of Natural Resources and Applied Life Sciences, Gregor Mendel-Strasse 33, A-1180 Wien, Austria

---

**Refreshment Break: Outside Ballroom 1 (9:40 AM - 9:50 AM April 23)**

---

**FNANO Track on Conformal, Magnetic, Electrostatic & Hydophobic-Hydrophilic Self-Assembly: Ballroom 1 (9:50 AM - 11:20 AM April 23)**

Track Chair: **Karl Bohringer** <karl@ee.washington.edu>, Department of Electrical Engineering, University of Washington, Seattle, WA

**Track Chair Overview Talk:**
Programmable Surfaces: Toward Massively Parallel Self-Assembly at the Micro- and Nano-scale (9:50 AM -10:20 AM)
  **Karl Bohringer**
3 Invited Talks:

- Programmable Self-Assembly from Nanoparticle Based Devices to Integrated Microsystems (10:20 AM -10:40 AM)
  Heiko Jacobs <hjacobs@ece.umn.edu>, Dept Electrical and Computer Engineering, U of Minnesota-Twin Cities, Minneapolis, MN

- Magnetic Self-Assembly “Equilibria” at a Macroscopic Scale (10:40 AM -11:00 AM)
  George C. Lisensky <lisensky@beloit.edu>, University of Wisconsin, Madison, WI

- Assembly Dynamics Observed in Fluidic Self Assembly (11:00 AM -11:20 AM)
  John Stephen Smith <jsmith@eecs.berkeley.edu>, Dept EECS, University California Berkeley, Berkeley, CA

Refreshment Break: Outside Ballroom 1 (11:20 AM - 11:50 AM April 23)

---

FNANO Track on Self-Assembled Surface Chemistry, Session A: Ballroom 1 (11:30 AM-12:30 PM April 23)
Track Chair: Lloyd Smith <smith@chem.wisc.edu>, Department of Chemistry, University of Wisconsin, Madison, WI

2 Invited Talks:

- Oriented Immobilization of Single DNA Molecules as a Tool for Surface Structuring on the Nanometer Scale (11:50 AM-12:10 PM)
  Frank F. Bier <frank.bier@ibmt.fraunhofer.de>, Fraunhofer Institute for Biomedical Engineering and University of Potsdam, Bergholz-Rehbruecke, Germany

- Patterning Self-assembled monolayers using a scanning probe: Technique and Utility (12:10 PM-12:30 PM)
  Christopher Gorman <chris_gorman@ncsu.edu>, Department of Chemistry, North Carolina State University, Raleigh, NC

---

Lunch: Golden Cliff Room (12:30 PM -1:20 PM April 23)

Self-Assembled Surface Chemistry Track Chair Overview Talk: Golden Cliff Room:
Surface Assembly of a Quaternary Nucleic (12:40 PM - 1:10 PM)
Lloyd Smith <smith@chem.wisc.edu>, Department of Chemistry, University of Wisconsin, Madison, WI

---

FNANO Track on Self-Assembled Surface Chemistry, Session B: Ballroom 1 (1:20 PM –2:00 PM April 23)
Track Chair: Lloyd Smith
2 Invited Talks:

- Creating Nanostructures through Self- and Directed Assembly (1:20 PM –1:40 PM)
  Paul Weiss <stm@psu.edu>, Pennsylvania State University, University Park, PA

- Spontaneous Formation of ~5 Å Ordered Phase-Separated Domains on the ligand shell of mixed Monolayer Protected Metal Nanoparticles (1:40 PM –2:00 PM)
  Francesco Stellacci <frstella@mit.edu>, Department of Materials Science and Engineering, Massachusetts Institute of Technology, Cambridge, MA

---

Refreshment Break: Outside Ballroom 1 (2:00 PM –2:10 PM April 23)

---

FNANO Track on Molecular Electronics Architectures: Ballroom 1 (2:10 PM - 3:40 PM April 23)
Track coChairs:
  Philip J. Kuekes <kuekes@hpl.hp.com>, Hewlett-Packard Corporation, Palo Alto, CA and
  R. Stanley Williams <stan_williams@hp.com>, Hewlett-Packard Corporation, Palo Alto, CA

Track Chairs' Overview Talk:
Integrated Bottom-Up and Top-Down Architecture and Manufacturing (2:10 PM -2:40 PM April 22)
  Philip J. Kuekes and R. Stanley Williams

3 Invited Talks:

- System Architectures & System Simulations for Molecular Electronic Nanomemories and Nanoproccessors (2:40 PM – 3:00 PM)
  James Ellenbogen <ellenbgn@mitre.org> and Carl A. Picconatto <picconatto@mitre.org> (speaker), MITRE Corporation, McLean VA

- Integration for Molecular Electronics (3:00 PM – 3:20 PM)
  Paul Franzon <paulf@unity.ncsu.edu>, Department of Electrical and Computer Engineering, North Carolina State University, Raleigh, NC

- Circuit and System Architecture for DNA-Guided Self-Assembly of Nanoelectronics (3:20 PM – 3:40 PM)
  Alvin Lebeck <alvy@cs.duke.edu>, Department of Computer Science, Duke University, Durham, NC
Refreshment Break: Outside Ballroom 1 (3:40 PM – 3:50 PM April 23)

FNANO Track on Fullerene Nanostructures: Ballroom 1 (3:50 PM – 6:00 PM April 23)
Track Chair: Jie Liu <j.liu@duke.edu>, Department of Chemistry, Duke University, Durham, NC

Track Chair Overview Talk: Direct Growth of Long and Aligned Single Walled Carbon Nanotubes for Nanoscale Electronic Applications (3:50 PM – 4:20 PM)
Jie Liu

5 Invited Talks:

- Simulations of nanotube-based structures and devices (4:20 PM – 4:40 PM)
  Jerry Bernholc <bernholc@ncsu.edu>, Department of Physics, North Carolina State University (NCSU), Raleigh, NC

- Fundamental Properties and Applications of Semiconducting Carbon Nanotubes (4:40 PM – 5:00 PM)
  Michael Fuhrer <mfuhrer@physics.umd.edu>, Department of Physics, University of Maryland, College Park, MD

- Growth of SWNT with controlled structure by tailoring catalyst composition and reaction environment (5:00 PM – 5:20 PM)
  Daniel E. Resasco <resasco@ou.edu>, School of Chemical Engineering and Materials Science, University of Oklahoma, Norman, OK

- Designing Carbon-Based Nanotechnology on a Supercomputer (5:20 PM – 5:40 PM)
  David Tomanek <tomanek@pa.msu.edu>, Department of Physics and Astronomy, Michigan State University, East Lansing, MI

- Controlled assembly of carbon nanotube structures and devices (5:40 PM – 6:00 PM)
  Otto Zhou <zhou@physics.unc.edu>, Material Science, Department of Physics, University of North Carolina (UNC), Chapel Hill, NC

Closing of Conference & Announcement of Plans for Next Year's FNANO Conference: Ballroom 1 (6:00 PM April 23)
John H. Reif, Conference Chair