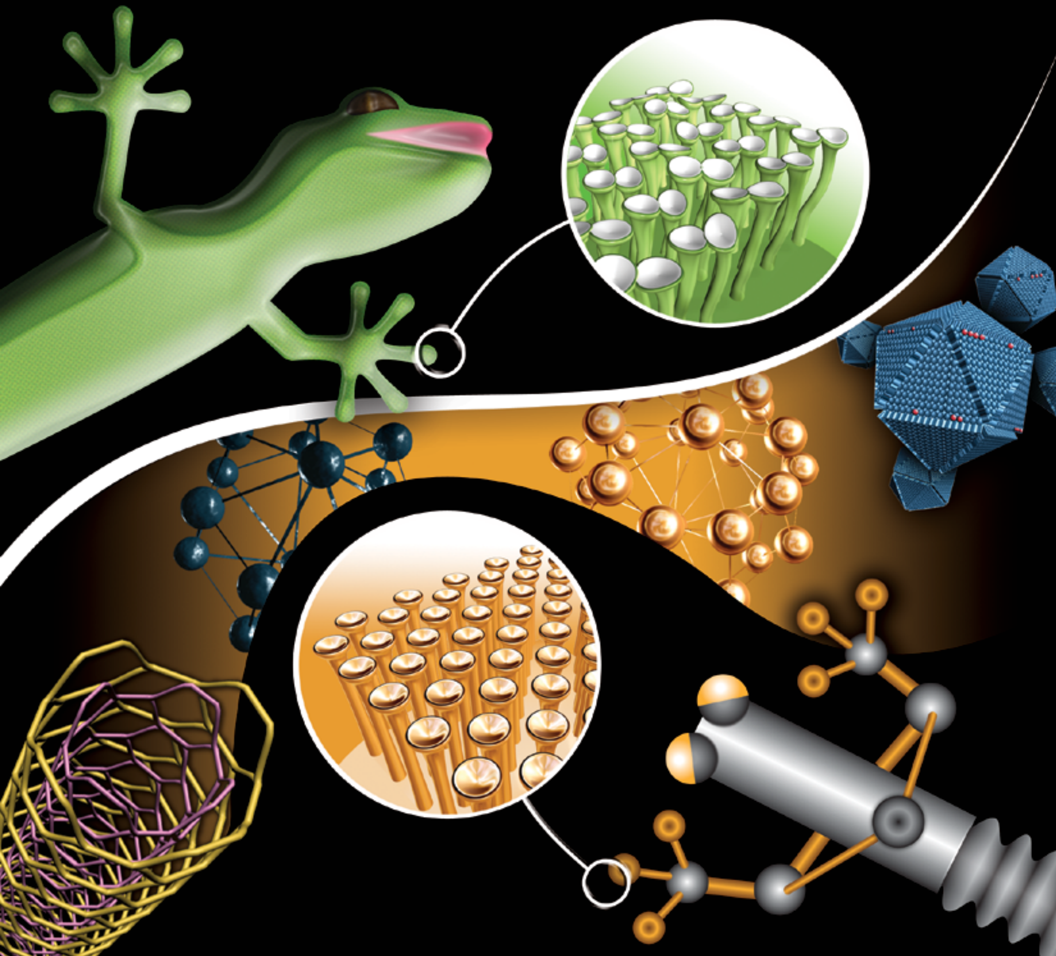


Frontiers of Nanotechnology & Biotechnology: Integration and Invention

21st Annual International Symposium

Center for Study of Gene Structure and Function
Hunter College, City University of New York
Room 714 Hunter West Building
East 68th Street at Lexington Avenue (#6 subway stop), New York City

Friday - January 18, 2008

SYMPOSIUM PROGRAM

http://genecenter.hunter.cuny.edu/GS2008

Center for Study of Gene Structure and Function

The Gene Center is a consortium of researchers within Hunter College of The City University of New York — one of the largest public universities in the nation. At the heart of the Gene Center's mission is an imperative to build unique collaborations among biologists, chemists, biopsychologists, biophysicists, and bioanthropologists; to recruit and equip outstanding faculty; to develop and share core research facilities; and to implement strategies for scientific networking.

Since the Center's inception in 1985, the growing number of papers published in peer-reviewed journals and the number and amount of grants obtained by the faculty have been the most visible hallmarks of the Center's success. The Gene Center provides a vibrant research environment marked by workshops on cutting-edge research techniques; frequent research colloquia by guest scientists; and an annual international symposium, which is a major event on the New York scientific calendar.

The Gene Center encourages bright undergraduates to make a career of scientific research by hosting a Summer Program for Undergraduate Research (SPUR). Established in 1994, SPUR was formed to prepare and mentor qualified American undergraduate students who would like to pursue graduate biomedical research. SPUR was especially developed to recruit and nurture minority talent. Hunter College is a leader in academic diversity, with an undergraduate student population that reflects the demographics of New York City. Dr. Robert Dottin, Director of the Gene Center, has successfully diversified the faculty and graduate student bodies, providing role models for excellence in Science.

Visit the Gene Center website: http://genecenter.hunter.cuny.edu

The RCMI Program enhances the research capacity and infrastructure at minority colleges and universities that offer doctorates in health sciences. http://www.ncrr.nih.gov/resinfra/ri_rcmi.asp

National Center for Research Resources

The NCRR provides laboratory scientists and clinical researchers with the environments and tools they need to understand, detect, treat, and prevent a wide range of diseases. This support enables discoveries that begin at a molecular and cellular level, move to animal-based studies, and then are translated to patient-oriented clinical research, resulting in cures and treatments for both common and rare diseases. NCRR connects researchers with one another, as well as with patients and communities across the Nation, to harness the power of shared resources and research. http://www.ncrr.nih.gov

National Institutes of Health

The NIH, a part of the U.S. Department of Health and Human Services, is the primary Federal agency for conducting and supporting medical research. Composed of 27 Institutes and Centers, the NIH provides leadership and financial support to researchers in every state and throughout the world. Its mission is science in pursuit of fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to extend healthy life and reduce the burdens of illness and disability. http://www.nih.gov

The Center for Study of Gene Structure and Function (Gene Center) at Hunter College is partnering with a consortium of prestigious institutions in close proximity in Manhattan's Upper East Side to establish the Clinical and Translational Science Center (CTSC), whose goal is to "facilitate research aimed at advancing and expediting new patient treatments and preventive interventions". The CTSC was awarded $49 million from the National Institutes of Health for transforming advanced research on the bench into state of the art patient care at the bedside or clinic, and for improving health outcomes in the community. The CTSC will create synergistic programs among these neighboring institutions: the lead institution, Weill Cornell Medical College (WMC), Memorial Sloan-Kettering Cancer Center (MSKCC), the Hospital for Special Surgery (HSS) and Hunter College's School of Nursing as well as our Gene Center .

Hunter's Gene Center provides many ongoing research projects that already address AIDS, cancer, neurodegenerative diseases and compliant behavior – all important aspects of clinical translational research. Modern electronic infrastructure and professional networks link minority scientists nationwide to enhance research in health disparities and to help recruit and nurture minority talent. An internet2 facility facilitates advanced research collaborations.

In sum, the unique cluster of institutions in the CTSC supports the NIH roadmap initiative of breaking down institutional and disciplinary silos to accelerate the clinical application of basic science discoveries.

The 21st annual international symposium of the Center for the Study of Gene Structure & Function (Gene Center) is supported by the Research Centers in Minority Institutions Program of the National Center for Research Resources of the National Institutes of Health, grant number G12 RR-03037. The Gene Center is a major partner in the Weill Cornell Clinical Translational Science Center.

Planning Committee

The Gene Center would like to thank the Symposium Planning Committee:

Hiroshi Matsui, Chair, Symposium Planning Committee
Associate Professor, Chemistry Department

Robert Dottin, Professor, Department of Biological Sciences
Director, Center for Study of Gene Structure and Function,

Diana Bratu, Assistant Professor
Department of Biological Sciences

David Foster, Professor
Department of Biological Sciences

Scott C. Blanchard, Assistant Professor of Physiology and Biophysics
Cornell University

Jeanne Waxman, Program Manager
Center for Study of Gene Structure and Function, Hunter College

Tammy Scozzafava, Program Assistant
Center for Study of Gene Structure and Function, Hunter College

Denise Charles, Program Administrator for Outreach and Communications
Center for Study of Gene Structure and Function, Hunter College

MORNING SESSION

9:00am **Opening and Welcoming Remarks**
Robert Dottin, Director of the Center for Study of Gene Structure & Function and Professor of Biology at Hunter College, CUNY
Jennifer J. Raab, President, Hunter College, CUNY

9:10am **Hiroshi Matsui**
Hunter College, City University of New York
Integrating Biotechnology and Nanotechnology to Lead the Frontiers of Sciences and Engineering

9:50am **Christine Ortiz**
Massachusetts Institute of Technology
Nanomechanics of Musculoskeletal and Exoskeletal Tissues

10:30am **Break**

10:45am **Tejal Desai**
University of California,San Francisco
Nanostructured Interfaces for Therapeutic Delivery

11:25am **Chad Mirkin**
Keynote Speaker
Northwestern University
The Oligonucleotide Nanoparticle Conjugate and the "Antisense Nanoparticle"

12:15pm **Lunch & Science Poster Session**

AFTERNOON SESSION

Introduction and Remarks

2:00pm **Robert Dottin,** Director of the Center for Study of Gene Structure & Function and Professor of Biology at Hunter College, CUNY
Willie D. McCullough, Director, Research Facilities Improvement Program, Division of Research Infrastructure, National Center for Research Resources, National Institutes of Health
Julianne Imperato-McGinley, Associate Dean for Translational Research and Education, Director and Principal Investigator of the CTSC, Weill Cornell Medical College

2:20pm **Tadashi Matsunaga**
Keynote Speaker
Tokyo University of Agriculture and Technology
Novel Nano-Biomaterial via Biomineralization

3:10pm **Jeffrey Schloss**
The National Human Genome Research Institute
Nanotechnology Research at the National Institutes of Health

3:50pm **Break**

4:05pm **Morley Stone**
Air Force Research Lab /DARPA
Bionanotechnology: an Air Force and DoD Perspective

4:45 **Awards for Best Posters**
Closing Remarks
Hiroshi Matsui, Hunter College, City University of New York

Hiroshi Matsui
Hunter College, City University of New York

Integrating Biotechnology and Nanotechnologyto Lead the Frontiers of Sciences and Engineering

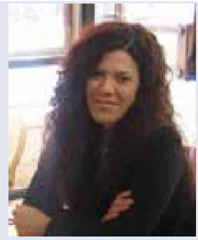
Abstract: Peptide nanoparticles and nanowires as smart building blocks for devices:

Non-lithographic fabrications of devices such as electronics and sensor have been studied extensively by assembling nanometer-sized building blocks into the device configurations. While various nanowires and nanoparticles with superior physical properties have been synthesized as the building blocks, more reproducible methods to assemble them onto precise positions are desirable to construct nanodevices. We have been fabricating peptide-based nanowires and functionalizing them with various recognition components (antibody), and our strategy is to use those functionalized peptide nanowires, which can recognize and selectively bind a well-defined region on antigen-patterned substrates, as building blocks to assemble three-dimensional nanoscale architectures at uniquely defined positions. This peptide nanowire incorporates smart multi-functionality, and we can turn on the biomineralization function of peptides on the nanowire sidewall to coat with various materials such as metals and semiconductors for electronics and sensor applications. It should be noted that the semiconductor mineralization of nanowires could be achieved at room temperature due to the catalytic function of peptides.

Development of pathogen diagnostic systems: Bioterrorism is becoming a major threat for many countries. To protect the public from such a biological attack, we need to establish improved diagnostic methods and sampling strategies in order to identify the pathogens more rapidly and precisely. In my group we have two approaches for the fabrication of pathogen diagnostic platforms. First, a lab-on-chip type of approach is to functionalize nanometer-scaled gap with antibodies and the detection can be made by measuring AC capacitance change between these electrodes before and after pathogens are bound. As a proof-of-concept, we have been distinguished 10 types of viruses by this model platform and this fingerprinting was made by the dielectric constant changes due to characteristic glycoproteins and capsid proteins of viruses.

Bio: Professor Hiroshi Matsui is currently an Associate Professor (tenured) in the Department of Chemistry at the City University of New York, Hunter College. After he received his B.S. degree in Chemistry at Sophia University, he worked at DuPont. Then, he moved back to academia and completed his M.S. degree in Materials Sciences & Engineering at Stanford University. After obtaining his Ph.D. degree in Physical Chemistry at Purdue University, he served as a Postdoctral Fellow at Columbia University. His research in the areas of Bionanotechnology; Biomimetic material synthesis, Bio-Electronics, and Biosensing is currently funded by the Department of Energy, the National Science Foundation, the National Institute of Health, and the Food and Drug Administration. His research projects are to fabricate electronics, sensors, and medical imaging/therapeutic systems by self-assembling protein and peptide on surfaces by using their molecular recognition function.

Professor Matsui was awarded the National Science Foundation Faculty Early Career Development Program "CAREER" Award in 2002. He was elected as a Frontier Member in the National Academy of Engineering in 2003 and also elected as an organizer for the Frontier Meeting of the National Academy of Engineering in 2006. Professor Matsui was awarded the Japan Society for the Promotion of Science Fellow in 2006. His research has a high impact on sciences and engineering, and was covered by various media (NBC news, Nature Materials, World Nanotechnology newsletter (http://nanotechweb.org/articles/news/2/12/5/1), Crain's New York Business, New Scientist, and Food Ingredient News). His recent report about the peptide nanowire fabrications became a Most-Accessed Article for the third-quarter of 2007 in Journal of the American Chemical Society (JACS), the report about the development of peptide nanoreactors was the top 10 most accessed article in 2006 in Supramolecular Chemistry, and the report about collagen-like triple helix peptides was selected as a hot paper in Angewandte Chemie International Edition in April 2007.



Christine Ortiz
Massachusetts Institute of Technology

Nanomechanics of Musculoskeletal and Exoskeletal Tissues

Abstract: Biological materials, such as musculoskeletal and exoskeletal tissues, have developed amazingly complex, hierarchical, heterogeneous nanostructures over millions of years of evolution in order to function properly under the mechanical loads they experience in their environment. In this talk, I will describe studies of these fascinating materials using "nanomechanics"; i.e. the measurement and prediction of extremely small forces within and between nanoscale constituents in order to provide a fundamental molecular-level understanding of the mechanical function, quality, and pathology of structural biological materials. Examples of materials under investigation to be discussed include; cartilage, bone, seashell nacre, and armored fish scales. A quad-tiered approach is taken in order to achieve this goal which includes; nanomechanics of single cells and their pericellular matrix, individual extracellular matrix molecules, biomimetic model systems, and tissue-level properties. The scientific foundation being formed has relevance to both the medical and engineering fields. Nanotechnological methods applied to the field of musculoskeletal tissues and tissue engineering hold great promise for significant and rapid advancements towards tissue repair and/or replacement and improved treatments for people afflicted with diseases such as osteoarthritis. In addition, the discovery of new nanoscale design principles and energy-dissipating mechanisms will enable the production of improved and increasingly advanced biologically-inspired structural engineering materials that exhibit "mechanical property amplification" - that is, dramatic improvements in mechanical properties (e.g. increases in strength and toughness) for a material relative to its constituents.

Bio: Professor Christine Ortiz obtained her B.S. from Rensselaer Polytechnic Institute in Troy, NY and her M.S. and Ph.D. from Cornell University in Ithaca, NY, all in the field of materials science and engineering. Her doctoral thesis focused on chemical synthesis and mechanical properties of liquid crystalline networks and was co-advised by Professor Edward Kramer and Professor Christopher K. Ober. After graduation, Professor Ortiz was granted a NSF-NATO post-doctoral fellowship and moved to the Department of Polymer Chemistry, University of Groningen, in the Netherlands in the research group of Professor Georges Hadziioannou. While in Holland, she learned atomic force microscopy, single molecule force spectroscopy, high resolution force spectroscopy, and related nanomechanical techniques. Professor Ortiz joined the faculty in the Department of Materials Science and Engineering at MIT as an Assistant Professor in 1999 and was tenured in 2006. Her research group focuses on the ultrastructure and nanomechanics of structural biological materials such as cartilage, bone, seashells, and armored fish. In 2002, Dr. Ortiz was awarded a National Science Foundation Presidential Early Career Award for Scientists and Engineers (NSF-PECASE) which was presented to her by President George W. Bush at the White House in Washington DC. Dr. Ortiz has served as a review panelist for NSF (SBIR, NSEC, and CAREER), NIH, and NASA (NBEI). Her research has been published in over 18 different peer-reviewed journals including most recently; Biophysical Journal, Physical Review Letters, Nano Letters, and Nature Materials and also has been featured in Physics Today, Science News, USA Today, the Discovery Channel and on the covers of the Journal of Structural Biology and the Journal of Material Science. She has given 90+ invited lectures including 20+ international in 12 countries and 8 different Gordon Research Conferences. Her research has been supported by NSF-PECASE, NSF-NIRT, NSF-CMSE, the Dupont-MIT Alliance, the Cambridge-MIT Institute, the MIT Institute for Soldier Nanotechnologies, the MIT-France Program, General Electric, 3M, GE, Raytheon, the Whitaker Foundation, and Lord Corporation. In 2007, Professor Ortiz was nominated and selected to participate in the 2008-2009 Defense Science Study Group. Professor Ortiz has a strong commitment to teaching, mentoring, and increasing diversity at all educational levels. She has developed and taught a popular new undergraduate course annually each spring semester "Nanomechanics of Materials and Biomaterials" and is a frequent participant in MITES (MIT Minority Introduction to Engineering and Science), MSRP (MIT Minority Summer Research Program), SACNAS (Society for Advancement of Chicanos and Native Americans in Science), Institute Diversity Committees, and SHPE (Society of Hispanic Professional Engineers). Professor Ortiz' full curriculum Vitae is located at: http://web.mit.edu/cortiz/www/OrtizCV2007Short12.pdf

Tejal Desai
University of California,San Francisco
Nanostructured Interfaces for Therapeutic Delivery

Abstract: In vivo cellular and drug delivery strategies are being developed that capitalize on the strengths of micro- and nanofabrication. By taking advantage of our ability to control chemistry and topography at submicron size scales, we can design synthetic devices which modulate cell function. Examples include nanoporous capsules for cellular delivery, microfabricated drug delivery devices to penetrate cellular barriers, and drug-eluting microrods to control tissue regeneration. Such engineered interfaces may be optimized for biomolecular selectivity and surface bioactivity. Micro- and nanotechnology can add flexibility to current delivery practices while becoming an enabling technology leading not only to new laboratory techniques, but also to new platforms for delivering therapy to the patient.

Bio: Dr. Tejal Desai is currently Professor of Physiology and Bioengineering at the University of California, San Francisco. She is also a member of the California Institute for Quantitative Biomedical Research and the UCSF/UC Berkeley Graduate Group in Bioengineering. Prior to joining UCSF, she was an Associate Professor of Biomedical Engineering at Boston University and Associate Director of the Center for Nanoscience and Nanobiotechnology at BU. She received the Sc.B. degree in Biomedical Engineering from Brown University (Providence, RI) in 1994 and the Ph.D. degree in bioengineering from the joint graduate program at University of California, Berkeley and the University of California, San Francisco, in 1998. Dr. Tejal Desai directs the Laboratory of Therapeutic Micro and Nanotechnology. Her research combines methods and materials originally used for micro-electro-mechanical systems to create implantable biohybrid devices for cell encapsulation, targeted drug delivery, and templates for cell and tissue regeneration. In addition to authoring over 90 technical papers, she is presently an associate editor of Langmuir, Biomedical Microdevices, and Sensors Letters and is editor of an encyclopedia on Therapeutic Microtechnology. She has chaired and organized numerousl conferences and symposia in the area of bioMEMS, micro and nanofabricated biomaterials, and micro/nanoscale drug delivery/tissue engineering. Her other interests include K-12 educational outreach, gender and science education, science policy issues, and biotechnology/bioengineering industrial outreach.

Desai's research efforts have earned her numerous awards. In 1999, she was recognized by Crain's Chicago Business magazine with their annual "40 Under 40" award for leadership. She was also named that year by Technology Review Magazine as one of the nation's "Top 100 Young Innovators" and more recently Popular Science's Brilliant 10. Desai's teaching efforts were recognized when she won the College of Engineering Best Advisor/Teacher Award. She also won the National Science Foundation's "New Century Scholar" award and the NSF Faculty Early Career Development Program "CAREER" award, which recognizes teacher-scholars most likely to become the academic leaders of the 21st century. Her research in therapeutic microtechnology has also earned her the Visionary Science Award from the International Society of BioMEMS and Nanotechnology in 2001, a World Technology Award Finalist in 2004, and the 2006 Eurand Grand Prize Award for innovative drug delivery technology.

Chad Mirkin
Keynote Speaker
Northwestern University
The Oligonucleotide Nanoparticle Conjugate and the "Antisense Nanoparticle"

Abstract: We have recently reported a new method for the control of protein expression using oligonucleotide-functionalized gold nanoparticles. These "antisense particles", as well as similarly functionalized siRNA particles, exhibit a range of unique properties that make them very well-suited for antisense applications. In particular, the particles are highly resistant to nuclease digestion, have high and tailorable binding constants for target mRNA, and exhibit high entry efficiency into multiple cell types. Further, we can tailor the chemistry on the nanoparticle surface, and thus control the particles' binding strength to complementary target sequences, ultimately demonstrating that changing the binding strength or surface chemistries offers means to control the degree of protein expression. These developments represent significant advances in antisense and siRNA technology for the control of protein expression.

Bio: Dr. Chad A. Mirkin is the Director of the International Institute for Nanotechnology, the George B. Rathmann Professor of Chemistry, Professor of Medicine, and Professor of Materials Science and Engineering.

Professor Mirkin is a chemist and a world renowned nanoscience expert, who is known for his development of nanoparticle-based biodetection schemes, the invention of Dip-Pen Nanolithography, and contributions to supramolecular chemistry. He is author of over 300 manuscripts and over 325 patents (66 issued). He is the founder of two companies, Nanosphere and NanoInk, which are commercializing nanotechnology applications in the life science and semiconductor industries. At present, he is listed as one of the top 10 most cited chemists in the world, and is the top most cited nanomedicine researcher in the world.

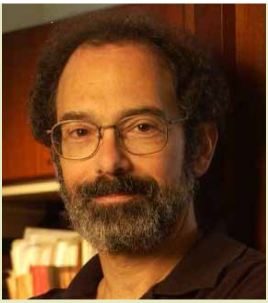
Professor Mirkin has been recognized for his accomplishments with over 50 national and international Awards. These include a iCON Innovator of the Year Award (2007), NIH Director's Pioneer Award, the Collegiate Inventors Award, National Inventors Hall of Fame (2002, 2004), an Honorary Doctorate Degree from Dickinson College, the Pennsylvania State University Outstanding Science Alumni Award, the ACS Nobel Laureate Signature Award for Graduate Education in Chemistry, a Dickinson College Metzger-Conway Fellowship, the 2003 Raymond and Beverly Sackler Prize in the Physical Sciences, the Feynman Prize in Nanotechnology, the Leo Hendrick Baekeland Award, Crain's Chicago Business "40 under 40 Award," the Discover 2000 Award for Technological Innovation, I-Street Magazine's Top 5 List for Leading Academics in Technology, the Materials Research Society Young Investigator Award, the ACS Award in Pure Chemistry, the PLU Fresenius Award, the Harvard University E. Bright Wilson Prize, the BF Goodrich Collegiate Inventors Award, the Camille Dreyfus Teacher-Scholar Award, the Alfred P. Sloan Foundation Award, the DuPont Young Professor Award, the NSF Young Investigator Award, the Naval Young Investigator Award, the Beckman Young Investigator Award, and the Camille and Henry Dreyfus Foundation New Faculty Award. He is a Fellow of the American Association for the Advancement of Science and has served on the Editorial Advisory Boards of over twenty scholarly journals. At present he is a member of the Editorial Advisory Boards of Accounts of Chemical Research, Advanced Materials, Angewandte Chemie, BioMacromolecules, Macromolecular Bioscience, SENSORS, Encyclopedia of Nanoscience and Nanotechnology, Chemistry-A European Journal, Chemistry & Biology, Nanotechnology Law & Business, The Scientist, Journal of Materials Chemistry, and Journal of Cluster Science, Plasmonics. Dr. Mirkin is the founding editor of the journal Small, one of the premier international nanotechnology journals, and he has coauthored two bestselling books on the field of nanobiotechnology.

Dr. Mirkin holds a B.S. degree from Dickinson College (1986, elected into Phi Beta Kappa) and a Ph.D. degree in chemistry from the Pennsylvania State University (1989). He was an NSF Postdoctoral Fellow at the Massachusetts Institute of Technology prior to becoming a chemistry professor at Northwestern University in 1991.

Tadashi Matsunaga
Keynote Speaker
Tokyo University of Agriculture and Technology
Novel Nano-Biomaterial via Biomineralization

Abstract: Nano-materials have attracted much attention for their versatile use in nanotechnology especially in the field of medical applications. Nano-sized magnetic particles offer vast potential in ushering new nano-techniques as they can be easily manipulated by magnetic force. Magnetic bacteria synthesize nano-sized biomagnetites, otherwise known as bacterial magnetic particles (BacMPs) that are individually enveloped by a lipid bilayer membrane. BacMPs are ultrafine magnetite crystals (50-100 nm diameters) with uniform morphology produced by Magnetospirillum magneticum AMB-1. The molecular mechanism of BacMP synthesis is a multi-step process which includes vesicle formation, iron transport and magnetite crystallization, and the elucidation of its mechanism by genomic, proteomic, and bioinformatic approaches has been conducted. The genome consists of a single circular chromosome of 4.9 M base pairs. The iron uptake system, and signal transduction controlling the switching on and off of iron biomineralization have also been analyzed. Furthermore, proteome analysis of the BacMP membrane proteins revealed that several unique proteins controlled the uniform morphology of BacMPs. This comprehensive analysis provides a clear–cut resolution of the elaborate regulation of BacMP synthesis, and we have succeeded in in vitro magnetite crystallization using these isolated unique proteins. Based on our elucidations on the molecular mechanism of BacMP formation in M. magneticum AMB-1, we have also designed functional nanomaterials. Through genetic engineering, functional proteins such as enzyme, antibody, and receptor were assembled onto BacMPs, and these functional BacMPs have also been utilized in various biosensors and bio-separation processes. The elucidation of the mechanism of iron biomineralization has provided a roadmap for the design of novel nano-biomaterials that would play a useful role in multidisciplinary fields.

Bio: Born in Tokyo in 1949, Dr. Matsunaga completed a degree in Synthetic Chemistry, and obtained Doctoral qualifications in Biotechnology, at Tokyo Institute of Technology. After studying as a Research Associate in Miami, USA, he returned to Japan to be an Associate Professor at Tokyo University of Agriculture and Technology. He was promoted to Full Professor in 1989, served as Dean of Engineering from 2001 to 2007, and now serves as Trustee and Vice President for Academic Affairs and Research, a position he has held since 2007. His main research areas are Bioelectronics, Nano-Biotechnology, and Marine Biotechnology. He has published over 300 international scientific papers, and received the 2003 Carnegie Centenary Professorship, the honorary degree of Doctor of Science from Heriot-Watt University in Edinburgh, U. K., and the Prizes of the Chemical Society of Japan, and the Japanese Society for Bioengineering and Bioscience.



Jeffrey Schloss
The National Human Genome Research Institute
Nanotechnology Research at the National Institutes of Health

Abstract: The National Institutes of Health support nanotechnology research to promote the development and application of these emerging technologies toward gaining a better understanding of disease mechanisms and developing improved diagnostic and therapeutic approaches. New research tools are already providing methods to study cells at a higher level of precision, including single molecule tracking and manipulation in live cells, to reveal basic molecular and cellular mechanisms. Nanotechnology also offers potential paths to improve conventional medical diagnostic tests and therapeutics, and to develop capabilities substantially surpassing those that are available today. By combining the deeper understanding of the underlying biology with knowledge gained by applying early generation nanotechnologies to improve "conventional" medicine, we anticipate generating brand new concepts and approaches that will enable effectively targeted medical interventions. Some of these will incorporate the ability to measure and manipulate (both move and modify) individual molecules or cohorts of molecules in living cell and tissues with high precision. Gaining these abilities will benefit not only medicine, but also other fields of nanotechnology applications as our studies reveal design principles that have evolved and been tested in nature for millennia in finely tuned, robust, and diverse living systems. Achieving these goals in a responsible manner incorporates efforts to understand and control the interaction of nanomaterials with biological systems, and to engage a wide range of stakeholders in planning for the safe and effective development and use of the emerging approaches.

Bio: Dr. Jeffery A. Schloss is Program Director for Technology Development Coordination in the Division of Extramural Research at the National Human Genome Research Institute (NHGRI), a component of the National Institutes of Health (NIH). At NHGRI, he manages a grants program in technology development for DNA sequencing and single nucleotide polymorphism (SNP) scoring, and serves the NHGRI Division of Extramural Research and Office of the Director as a resource on genome technology development issues. He led the team that launched, and continues to coordinate, the Centers of Excellence in Genomic Science, and initiated a program to foster effective collaborations to validate new sequencing technologies for use in high-throughput laboratories. He manages the institute's program to develop technologies with which to sequence an entire human genome for $1000. He previously served the NHGRI as program director for large-scale genetic mapping, physical mapping, and DNA sequencing projects. Dr. Schloss represents NHGRI on the NIH Bioengineering Consortium, BECON, established in 1997 to foster support for bioengineering research. Schloss served as the chair of BECON from 2001-2004. Among his numerous BECON activities, he co-organized the BECON 2000 symposium on nanotechnology in biomedicine. He represents the NIH on the National Science and Technology Council's (NSTC) subcommittee on Nanoscale Science, Engineering and Technology (NSET), planning for the National Nanotechnology Initiative. He also co-chairs the Trans-NIH Nano Task Force and the NIH Nanomedicine Roadmap Initiative working group. Dr. Schloss has worked with local high school students, teaching about DNA sequencing and the ethical and societal implications of Human Genome Project. Prior to coming to the NIH, Dr. Schloss served on the biology faculty at the University of Kentucky. He earned the B.S. degree with honors from Case Western Reserve University, the Ph.D. in Cell Biology from Carnegie-Mellon University, and conducted postdoctoral research at Yale University. Dr. Schloss's research in cell and molecular biology included the study of non-muscle cell motility and regulation of mRNA expression.

Morley Stone
Air Force Research Lab /DARPA
Bionanotechnology: an Air Force and DoD Perspective

Abstract: The intersection of biotechnology and nanotechnology is producing enormous revolutions in areas like medical diagnostics, pushing limits of detection and challenging standard practices like enzymatic amplification, i.e., PCR. Our laboratory has been investigating the best way to harness this technological revolution for defense applications. Our key focus has been to exploit biological signal transduction in both in vitro and in vivo systems. I will cover approaches that are underway to examine various RNA structures, i.e., riboswitches, and the potential to communicate and quantify switch activity using cellular assays. Alternatively, nanotechnology, namely nanoparticles, presents an attractive means to convey switch activity in vitro, through spectral shifts associated with controlling nanoparticle aggregation state. An overview and associated pros and cons associated with each approach will be presented.

Bio: Morley O. Stone is a Senior Scientist (ST), Molecular Systems Biotechnology, Human Effectiveness Directorate, Air Force Research Laboratory (AFRL/HE) and Chair, Bio-X Strategic Technology Thrust (STT). Prior to this assignment, Morley was Chief, Hardened Materials Branch, Materials and Manufacturing Directorate (AFRL/ML). From 2003-2006, he was detailed as a Program Manager with the Defense Sciences Office of the Defense Advanced Research Projects Agency (DARPA/DSO) where he directed programs in bio-inspired robotics (Biodynotics), molecular electronics (Moletronics and MoleApps), bio-inspired/bio-derived sensors (Stealthy Sensors and BioSenSE), cephalopod biology (CAL), and chemical odorants (Unique Signature Detection). His Ph.D. in biochemistry is from Carnegie Mellon University and he has worked in the biotechnology/materials science area for 15 years. Within the area of biomimetics, he has strong interests in sensing, biological self-assembly, biological coloration, soft-matter patterning/lithography, biomineralization, and structural biological materials like silk and elastin. In addition to authoring over 70 publications and giving over 50 invited presentations, he has received an Air Force-sponsored award for Scientific Achievement in 1999, won the Air Force Research Laboratory Commander's Cup in 2002 (given to the outstanding civilian among 6000+ employees), and was recognized with an Air Force-sponsored award for Leadership Excellence in 2003. His research team has been designated as a Star Team by the Air Force Office of Scientific Research. In 2005, he was elected a Fellow of AFRL and was recently awarded the OSD medal for Exceptional Civilian Service. He is a Fellow of the International Society of Optical Engineering (SPIE), a member of the American Chemical Society, the Materials Research Society, and an adjunct faculty member at The Ohio State University.

Thank you for attending
the 21st Annual International Symposium
of the Center for Study of Gene
Structure & Function at Hunter College.
We look forward to seeing you at the 22nd Annual
International Symposium on Cancer in January 2009