

New Faculty Awards Program

<u>Institution</u>	<u>Awardee</u>	<u>Department</u>	<u>Area of Interest</u>
2007			
Brandeis University	Douglas L. Theobald	Biochemistry	Structure-function perturbation studies of resurrected ancestral proteins: Atomic-resolution visualization of adaptive evolutionary trajectories and potentials
Georgia Institute of Technology	Sven H. Behrens	Chemical and Biomolecular Engineering	From Stimulus-Responsive Polymers to "Smart Capsules": Fundamentals of Polymer-Mediated Particle Interaction and Directed Assembly for Drug Encapsulation and Triggered Release
Harvard University	Adam E. Cohen	Chemistry and Chemical Biology	I will measure the local mechanical properties of DNA to understand how the mechanics affects protein binding
Northwestern University	Justin M. Notestein	Chemical and Biological Engineering	Novel oxidation catalysts from surface-grafted organometallics to form cooperative organic-inorganic interfaces for energy needs and sustainability
The Pennsylvania State University	Tae-Hee Lee	Chemistry	Dynamics of enzymatic reactions: Single molecule research on the role of fluctuations in molecular recognition by enzymes
The University of Chicago	Gregory S. Engel	Chemistry	Probing photoreactions at conical intersections with ultrafast spectroscopy: developing routes to design novel enzymatic photoreactivity
University of California, Berkeley	Michelle C. Chang	Chemistry	Chemical approaches for biofuel synthesis in microbes
University of California, San Diego	Joshua S. Figueroa	Chemistry and Biochemistry	Oxygen-Oxygen Bond Coupling by Ruthenium-Arene Complexes Relevant to Synthetic Water Splitting
University of California, Santa Barbara	M. Scott Shell	Chemical Engineering	Development of novel computational methods for the rational design of peptide and protein technologies
University of Washington, Seattle	Munira Khalil	Chemistry	Mapping vibrational phase and energy relaxation during photoinduced electron transfer processes using femtosecond two-dimensional infrared spectroscopy
Yale University	David A. Spiegel	Chemistry	A Synthetic Approach to Studying Advanced Glycation End-Products, a Class of Natural Products Found in Humans

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Columbia University	Scott A. Snyder	Chemistry	The development of enantioselective halogenation reactions of broad utility to study the chemistry and biology of the napyradiomycins.
Cornell University	Hening Lin	Chemistry and Chemical Biology	Organic synthesis, biochemistry, biophysics and molecular and cell biology to study enzyme-catalyzed protein posttranslational modifications.
Georgia Institute of Technology	Wendy L. Kelly	School of Chemistry and Biochemistry	Examination of the mechanisms of unusual cyclizations in polyketide and nonribosomal peptide antibiotic biosynthesis: application toward biosynthetic engineering.
Iowa State University	Eric W. Cochran	Chemical and Biological Engineering	Thermodynamics and dynamics of heterogeneous polymeric materials via hierarchical self-assembly: synthesis, characterization, and self consistent field theory.
Northeastern University	Penny J. Beuning	Chemistry and Chemical Biology	The proposed research seeks to determine the specificity of specialized, lesion-bypass DNA polymerases for potentially mutagenic DNA lesions.
Purdue University	Brian C. Dian	Chemistry	This proposal demonstrates how structure and kinetics can be obtained from the rotational spectrum of a molecule, when coupled with an ultraviolet laser, allowing the structural evolution of a reactive molecule to be mapped in time.
Texas A&M University	Christian B. Hilty	Chemistry	To study membrane proteins by NMR, and to develop novel methods of pre-polarization for determining interactions and dynamic processes.
The University of Iowa	Amanda J. Haes	Chemistry	Enhanced Pathogen Sensing Via the Integration of Molecular Beacon and Nanoparticle Technologies
University of Chicago	Jun Yin	Chemistry	Phage display method for the high throughput profiling of posttranslational modification enzymes targeting p53 and histone.
University of Connecticut	Jose A. Gascon	Chemistry	A First principles approach will be developed to obtain a self-consistent polarized representation of protein electrostatic potentials and to understand vertebrate vision at the molecular level.
University of Illinois	Ryan C. Bailey	Chemistry	This proposal describes two key technologies aimed at providing a molecular fingerprint and thus an informative diagnosis of cancer.
University of Minnesota	Kevin D. Dorfman	Chemical Engineering and Materials Science	A new microfluidic separation technique, "dynamic gel electrophoresis," will be developed to resolve supercoiled DNA and other structured biomolecules.

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California Institute of Technology	Shu-ou Shan	Chemistry & Chemical Engineering	Molecular Mechanism of A Targeting Machine - Signal Recognition Particle Mediated Protein Translocation Across the ER or Plasma Membranes
Cornell University	Peng Chen	Chemistry and Chemical Biology	Single molecule bioinorganic chemistry: protein interactions in metallochaperones and electron transfer proteins, metalloprotein folding, and metal trafficking in living cells.
Kent State University	Hanbin Mao	Chemistry	The proposal describes single-molecular platforms in a laser-tweezers instrument for studies of stochastic sensing and polyvalent binding.
Stanford University	Jennifer J. Kohler	Chemistry	We will define the molecular mechanisms of glycan biosynthesis and use this knowledge to engineer cells that produce novel glycans.
The Pennsylvania State University	John B. Asbury	Chemistry	Mechanism of light-induced defect formation and meta-stabilization in hydrogenated amorphous semiconductors determined with ultrafast transient 2DIR spectroscopy.
University at Buffalo	Matthew D. Disney	Chemistry	Our aim is to develop an RNA-small molecule chemical code to enable rational design of binders to any RNA structure.
University of California, Irvine	Rachel W. Martin	Chemistry	Her research focus is the structural and biophysical characterization of locally ordered protein networks by solid-state nuclear magnetic resonance spectroscopy.
University of Illinois	Martin D. Burke	Chemistry	This proposal describes the synthesis and study of amphotericin B, a prototypical small molecule-based ion channel.
University of Notre Dame	Steven A. Corcelli	Chemistry and Biochemistry	New theoretical and computational methods for studying electron and proton transfer reactions in confined aqueous environments will be developed.
University of South Florida	Ryan G. Toomey	Chemical Engineering	I am developing novel biomimetic surfaces for targeted catch and release of nanometer to micron sized objects for selective separations.
University of Wisconsin-Madison	Frank N. Keutsch	Chemistry	Quantitative measurement and analysis of the spatial and temporal variations in chemical species of importance to atmospheric chemistry.

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Brandeis University	Jin-Quan Yu	Chemistry	Elucidation and exploitation of C-H activation pathways using binding auxiliaries: asymmetric and catalytic functionalizations of sp ³ C-H bonds
Massachusetts Institute of Technology	Kristala L. J. Prather	Chemical Engineering	The proposed research is concerned with methods for optimizing recombinant gene dosages to maximize productivity in metabolically engineering E. coli.
Texas A&M University	Yi Qin Gao	Chemistry	Theoretical studies of chemomechanical coupling mechanism and kinetics in biological systems. Development of rate theory for complex systems.
University of California, Berkeley	Christopher J. Chang	Chemistry	Mechanisms of metal-mediated oxidative signaling, stress, and damage in the brain and central nervous system. To develop fluorescent probes for tracking redox-active copper and oxygen metabolites in living cells and tissue with high spatial and temporal resolution. Tools and tactics are described for the synthesis and application of new sensors for optical imaging in biological environments.
University of California, Santa Barbara	Song-i Han	Chemistry & Biochemistry	To find fundamental solutions that overcome the sensitivity limitation of NMR and MRI. Spectroscopy would be facilitated by such methodologies.
University of Florida	Adam S. Veige	Chemistry	Group 6 (Mo(IV), W(IV)) Square Planar Complexes Supported By New Tri-anionic Pincer Type Ligands. This research program aims to exploit very straightforward structural, electronic, and reactivity tenets to design reactive early transition metal complexes for the purpose of small molecule activation and catalysis.
University of Illinois	Benjamin J. McCall	Chemistry	Structure, dynamics, and astrochemistry of carbocations and C ₆₀ explored using laboratory spectroscopy and astronomical observations
University of North Carolina at Chapel Hill	Garegin A. Papoian	Chemistry	We propose to investigate the role of biomolecular fluctuations in dynamic cell-biological processes such as signal transduction and enzymatic catalysis.
University of Rochester	Harry A. Stern	Chemistry	The primary goal of the proposed research is to shed light on the molecular basis of signal transduction across cell membranes, by computer simulations of G protein-coupled receptors (GPCRs).

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Boston College	Steven D. Bruner	Chemistry	Structure and mechanism of natural product biosynthesis enzymes
Cornell University	Abraham D. Stroock	Chemical and Biomolecular Engineering	Physicochemical concepts for controlling structure and function on micro- and nano-scales
Indiana University	Srinivasan S. Iyengar	Chemistry	Ab initio quantum wavepacket and electronically non-Adiabatic dynamics of biological and nanotechnological systems
Northwestern University	Bartosz Grzybowski	Chemical Engineering	Dynamic self-assembly in molecular-scale through macroscopic systems: underlying principles and applications in science and engineering
University of California at Santa Barbara	Jeffrey W. Bode	Chemistry and Biochemistry	Design, synthesis, and applications of adaptive organic molecules
University of Chicago	Aaron R. Dinner	Chemistry	Modeling molecular mechanisms of cellular dynamics: from DNA repair to signaling in the immune system
University of Michigan, Ann Arbor	Melanie S. Sanford	Chemistry	Exploring problems at the interface of organic and inorganic chemistry using synthetic and mechanistic organometallic chemistry to discover new reactions of transition metal complexes
University of Minnesota	Jennifer A. Maynard	Chemical Engineering and Materials Science	Bioinformatics will be exploited to identify bacterial genes for the construction of proteins used to stimulate T-cell and cytokine responses
University of Pennsylvania	Ivan J. Dmochowski	Chemistry	Methods, molecules, and microscopes for better biological imaging
University of Utah	Ilya Zharov	Chemistry	Rigid nitrogen-containing macrocycles: building blocks for nano-scale assemblies