

# 2012 Natural Materials, Systems & Extremophiles Program Review

Dr. Hugh DeLong | January 7-11, 2013 | Washington, DC

## National Museum of the American Indian on the National Mall

Fourth Street & Independence Avenue, SW

Washington, DC 20560

### AGENDA - Day 1 – Monday, January 7, 2013

Time	Title of Project	Speaker
7:00-7:45	<b>Registration</b>	
7:45-8:00	Welcome, Introduction and Background	<b>Hugh De Long</b> and <b>Katie Wisecarver</b> , Air Force Office of Scientific Research
8:00-8:35	<a href="#">Bio-Inspired Optics: Offering Physical and Technological Insights in Color and Structure</a>	<b>Joanna Aizenberg</b> Harvard College
8:35-9:05	<a href="#">Bio-Nanocombinatorics to Achieve Precisely-Assembled, Multicomponent, Functional Hybrid Nanomaterials</a>	<b>Paras Prasad</b> SUNY Buffalo
9:05-9:40	<a href="#">BioPAINTS MURI: Bio-Enabled Particle Adherents for Interrogative Spectroscopy</a>	<b>Carson Meredith</b> Georgia Institute of Technology
9:40-10:10	<b>BREAK</b>	
10:10-10:45	<a href="#">MURI: BioProgrammable One-, Two- and Three-Dimensional Materials</a>	<b>Chad Mirkin</b> Northwestern University
10:45-11:20	<a href="#">Engineering Robust Nanocomposite Networks</a>	<b>Jeffrey Urbach</b> Georgetown University
11:20-1:00	<b>LUNCH</b>	
1:00-1:35	<a href="#">Nanostructured Interfaces and Patterning Tools for Probing Bioinspired Materials and Systems</a>	<b>Chad Mirkin</b> Northwestern University
1:35-2:10	<a href="#">Adaptive and Self-Selecting Peptide Gels Through Molecular Networks</a>	<b>Rein Ulijn</b> University of Strathclyde
2:10-2:45	<a href="#">Electrogelation of Biopolymers for New Functional Materials</a>	<b>David Kaplan</b> Tufts University
2:45-3:15	<b>BREAK</b>	
3:15-3:50	<a href="#">Spider Gland Fluids: From Protein-Rich Isotropic Liquid to Insoluble Super Fiber</a>	<b>Gregory Holland</b> Arizona State University
3:50-4:25	<a href="#">Discovery of High-Performance Biomaterials for Defense Applications</a>	<b>Brook Swanson</b> Gonzaga University
4:25	<b>ADJOURNED FOR THE DAY</b>	

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### AGENDA - Day 2 – Tuesday, January 8, 2013

Time	Title of Project	Speaker
7:00-8:00	<b>Registration</b>	
8:00-8:35	<a href="#">Morphing and Modeling: Dynamic 3D Skin and Brilliant White Structural Coloration in Cephalopods</a>	<b>Roger Hanlon</b> Marine Biological Laboratory
8:35-9:10	<a href="#">Reprogramming Microbes for the Remote Detection of Environmental Threats</a>	<b>Justin Gallivan</b> Emory University
9:10-9:45	Characterization of Extreme Radiation Protection of Human Cells Conferred by Deinococcus Radiodurans-Derived Complexes	<b>Thomas Lamkin</b> AFRL
9:45-10:15	<b>BREAK</b>	
10:15-10:50	<a href="#">Damage Avoidance and DNA Repair Mechanisms of Extreme Halophiles to Ionizing Radiation</a>	<b>Jocelyne DiRuggiero</b> Johns Hopkins University
10:50-11:25	<a href="#">Novel Protection Paradigms Based on Defenses against Ionizing Radiation in the Extremophile Deinococcus Radiodurans</a>	<b>Michael Daly</b> Uniformed Services University of the Health Sciences
11:25-12:00	<a href="#">Engineering Ultrastable Protein Filaments into 2D and 3D Templates for Advanced Nanomaterials: A New Dimension in Materials Design</a>	<b>Douglas Clark</b> University of California at Berkeley
12:00-1:30	<b>LUNCH</b>	
1:30-2:05	<a href="#">Novel Protein Folding Pathways for Protein Salvage and Recycling</a>	<b>Frank Robb</b> University of Maryland
2:05-2:40	<a href="#">Maintaining Genetic Integrity under Extreme Conditions: Novel DNA Damage Repair Biology in the Archaea</a>	<b>Stuart MacNeill</b> University of St. Andrews
2:40-3:15	<a href="#">Increasing the Diversification Potential of the S-Layer Based Molecular Construction Kit (Strategies for Functional Multilayer Self-Assembly Systems)</a>	<b>Uwe Sleytr and Eva M. Egelseer,</b> University of Natural Resources & Applied Life Science
3:15-3:55	<a href="#">Development and Characterization of Novel Bioluminescent Systems</a>	<b>Bruce Branchini</b> Connecticut College
3:55	<b>ADJOURNED FOR THE DAY</b>	

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## AGENDA - Day 3 – Wednesday, January 9, 2013

Time	Title of Project	Speaker
7:00-8:00	<b>Registration</b>	
8:00-8:35	<a href="#">Macromolecular Modeling of Biomimetic Assembly</a>	<b>Murugappan Muthukumar</b> University of Massachusetts, Amherst
8:35-9:10	<a href="#">Chaetopsins: New Proteins Involved in the Light Production of the Marine Worm Chaetopterus Variopedatus</a>	<b>Dimitri Deheyn</b> Scripps Institute for Oceanography
9:10-9:45	Biomass Processing Using Ionic Liquids	<b>Wesley Henderson</b> North Carolina State University
9:45-10:15	<b>BREAK</b>	
10:15-10:50	<a href="#">Combinatorial Screening of Emergent Nanophotonic Behavior through Biomolecule-Encoded Superlattice Formation</a>	<b>Vinayak Dravid</b> Northwestern University
10:50-11:25	<a href="#">Bio-Nanocombinatoric Synthesis and Quorum Sensing</a>	<b>Michael McAlpine</b> Princeton University
11:25-1:00	<b>LUNCH</b>	
1:00-1:35	Microbial Physiology, Biofilms and Polymer Chemistry in Biodeterioration of Polymeric Coatings	<b>Wendy Goodson</b> AFRL
1:35-2:10	<a href="#">S-Layer Based Bio-Imprinting – Synthetic S-Layer Polymers</a>	<b>Dietmar Pum</b> Zentrum Fuer Nanobiotechnologie
2:10-2:45	<a href="#">Biocompatible and Biomimetic Self-Assembly of Functional Nanostructures</a>	<b>C. Jeffrey Brinker</b> University of New Mexico
2:45-3:15	<b>BREAK</b>	
3:15-3:50	<a href="#">Guiding Nanomaterial Assembly with High Fidelity using Biomimetic Interactions</a>	<b>Mathew Maye</b> Syracuse University
3:50-4:25	<a href="#">Discrete Photoswitchable Nucleic-Acid Nanoaggregates for Remote Sensing</a>	<b>David Ginger</b> University of Washington
4:25-5:00	<a href="#">Buckling of Bilayer Laminates: A Novel Approach to Synthetic Papillae</a>	<b>Sachin Velankar</b> University of Pittsburgh
5:00	<b>ADJOURNED FOR THE DAY</b>	

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## AGENDA - Day 4 – Thursday, January 10, 2013

Time	Title of Project	Speaker
7:00-8:00	<b>Registration</b>	
8:00-8:35	<a href="#">Quantitative Analysis, Design and Fabrication of Biosensing and Bioprocessing Devices in Living Cells</a>	<b>Domitilla Del Vecchio</b> Massachusetts Institute of Technology
8:35-9:10	<a href="#">Complex Effects of Molecular Topology, Length and Concentration on Molecular Dynamics in Entangled DNA Blends</a>	<b>Rae Anderson</b> University of San Diego
9:10-9:45	Bio-Enabled Synthesis and Assembly of Nanostructured Materials	<b>Rajesh Naik</b> AFRL
9:45-10:15	<b>BREAK</b>	
10:15-10:50	Translation Control of Natural Systems: Development of Cell-Based Sensors	<b>Nancy Kelley-Loughnane</b> AFRL
10:50-11:25	Processing, Structural Analysis and Applications of Biopolymers	<b>Rajesh Naik</b> AFRL
11:25-12:00	<a href="#">Integration of Natural Polymers and Synthetic Nanostructures</a>	<b>Vladimir Tsukruk</b> Georgia Institute of Technology
12:00-1:30	<b>LUNCH</b>	
1:30-2:05	<a href="#">Natural Fiber Welding - Ionic Liquid Facilitated Biopolymer Mobilization and Reorganization</a>	<b>Paul Trulove</b> United States Naval Academy
2:05-2:40	<a href="#">Fundamental Studies of Hierarchical Toughening and Interface/Interphase Characterization of Cellulose Nanofiber Based Nanocomposites</a>	<b>Jeffrey Gilman</b> NIST
2:40-3:15	<a href="#">Carbohydrate Nanotechnology: Hierarchical Assemblies and Information Processing with Oligosaccharide-Synthetic Lectin Host-Guest Systems</a>	<b>Adam Braunschweig</b> New York University
3:15-3:45	<b>BREAK</b>	
3:45-4:20	Guiding Nanomaterial Assembly with High Fidelity using Biomimetic Interactions	<b>Michael Mayer</b> University of Michigan
4:20	<b>ADJOURNED FOR THE DAY</b>	



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## AGENDA - Day 5 - Friday, January 11, 2013

Time	Title of Project	Speaker
7:00-8:00	<b>Registration</b>	
8:00-8:35	<a href="#">Novel Ways of Studying Silks and a Novel Silk</a>	<b>Fritz Vollrath and Chris Holland</b> University of Oxford
8:35-9:10	<a href="#">Biopolymer Processing Using Ionic Liquids for Feedstock Chemicals Production</a>	<b>William Reichert</b> University of South Alabama
9:10-9:45	<a href="#">Uncovering and Validating Toughening Mechanisms in High Performance Composites</a>	<b>David Kisailus and Pablo Zavattieri</b> University of California, Riverside
9:45-10:15	<b>BREAK</b>	
10:15-10:50	<a href="#">Thin Film Self-Assembly of Globular Protein-Polymer Diblock Copolymers for Nanostructured Biofunctional Materials</a>	<b>Bradley Olson</b> Massachusetts Institute of Technology
10:50-11:25	Determination of the Minimal Functional Units of Reflectins	<b>Wendy Goodson</b> AFRL
11:25-12:00	Autonomously Evolving Biocatalysts and Functional Materials	<b>Nathan Gianneschi</b> University of California, San Diego
12:00-1:30	<b>LUNCH</b>	
1:30-2:05	<a href="#">Biomolecular Programming of Discrete Nanomaterials</a>	<b>Nathan Gianneschi</b> University of California, San Diego
2:05-2:40	<a href="#">Optimal Learning for Efficient Experimentation in Nanotechnology and Biochemistry</a>	<b>Warren Powell</b> Princeton University
2:40-3:15	<a href="#">Neural Regulation of Chromatophore Function in Cephalopods</a>	<b>Nathan Tublitz</b> University of Oregon
3:15	<b>MEETING ADJOURNED</b>	