CUNY Institute for Macromolecular Assemblies (MMA)

Tel. (212) 650-8803 Published by the CUNY Institute for Macromolecular Assemblies @The City College of New York Dr. Ruth E. Stark, Director Spring/Summer 2014
Editor: Ruth E. Stark Staff Writer: Helena Leslie Graphic Designer: Lauren Gohara

Recent Publications


Update on CUNY’s Decade of Science: Intellectual and Physical Infrastructure to Complement MMA Goals

The Advanced Science Research Center, which is approaching completion on CUNY’s South Campus, is already changing the face of science at CUNY. Two internationally acclaimed scientists have recently been appointed to the center’s leadership, joining Dr. Charles Vörösmarty, who heads the Environmental CrossRoads Initiative. They are Dr. Kevin H. Gardner, who comes to the University as director of the ASRC’s Structural Biology Initiative and Einstein Professor of Chemistry at CCNY, and Dr. Rein V. Ulijn, who joins as director of the ASRC’s Nanoscience Initiative and Einstein Professor of Chemistry at Hunter. Both of these highly distinguished academics are experts in research fields which intersect in significant ways with the work being done by faculty-led teams at the MMA.

ASRC Structural Biology Initiative

Dr. Gardner, who holds a doctorate from Yale, is a molecular biophysicist and biochemist. In announcing his appointment, CUNY Vice Chancellor Gillian Small described him as being known for thinking broadly across disciplines and cited his experience in commercializing his research. This background qualifies him perfectly for leadership at ASRC, where he will play an important part in establishing the collaborative environment which is planned to be the center’s hallmark and in developing its commitment to translational research.

Dr. Gardner is moving his lab from the University of Texas Southwestern Medical Center, where he and his colleagues have been studying the natural regulation of environmentally-switched protein/protein interaction domains, with a view to understanding how to artificially control them in vitro and in living cells. This approach is exemplified by the lab’s two main initiatives: its work on blue light photosensing, which concentrates on plants and bacteria, and its complementary investigations of parts of the hypoxia response in human systems and invertebrates. The pursuit of these two research prongs has yielded ground-breaking discoveries about the role which light and oxygen play in protein-ligand interactions and the regulation of biological macromolecular function. In a potentially huge advance for cancer treatment, Dr. Gardner and coworkers have used nuclear magnetic resonance (NMR) spectroscopy, X-ray crystallography and other methods to discover small molecules which can turn fundamental aspects of a cell on or off. This advance has provided a critical proof-of-concept for the ability to override the switches which transform normal cells into cancer cells, with tremendous implications for improving patients’ lives.

“As we transfer our work to New York,” says Dr. Gardner, “having colleagues nearby at the MMA will be a critical asset.” Dr. Gardner, who is himself a leading expert in structural biology, continues “We look forward to working with the groups at the MMA, which are highly skilled in NMR spectroscopy, X-ray crystallography and electron microscopy, to study challenging biological systems. In addition to including biophysicists and biochemists like ourselves, the MMA is made up of scientists and engineers from many other disciplines. We hope that they will join us in tackling a wide range of scientific problems through the lenses of their respective areas of expertise, as we anticipate joining them in their investigations.”

“I look forward to promoting the ASRC’s culture of collaboration between disciplines within Structural Biology and also between Structural Biology and the center’s other focus areas of Nanoscience, Photonics, Neuroscience and Environmental Sciences,” says Dr. Gardner. “As I establish my lab in New York, I know that the research we are doing will be a prime beneficiary.”

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The ASRC nearing completion.

Dr. Kevin H. Gardner

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Lesley Davenport (Brooklyn) is currently serving on the editorial boards for *Journal of Spectroscopy* and *Biomedical Spectroscopy and Imaging*. She gave invited talks at the East China National University, Shanghai, and the Laboratory of Molecular Biophysics, NIH/NHLBI.

C. Michael Drain (HC) will be a featured speaker at the International Conference on Porphyrins and Porphyrin Analogues in Istanbul, Turkey in June, 2014.

Ranajeet Ghose (CCNY) is PI on a 5-year NSF grant, “Conformational Dynamics and Regulatory Interactions in a Bacteriophage RNA Polymerase Complex.”

Gabor Herman (GC) is the co-organizer of the 5th Annual Minisymposium on Computational Methods for Three-Dimensional Microscopy Reconstruction, New York.

David Jeruzalmi (CCNY) is PI on a 3-year NSF grant, “The Bacterial Nucleotide Excision Repair Pathway.”

Reza Khayat (CCNY) is PI on an NIH SCORE SC1 grant, “Mechanism of Cellular Recognition and Entry by a Circovirus.”

Frida Kleiman (HC), in collaboration with Anjana Saxena (Brooklyn), is PI on an NIH R21 grant, “Role of Nucleolin in Regulating mRNA Stability during DNA Damage Response (DDR).”

Ronald Koder (CCNY) is PI on a 3-year NSF grant, “Collaborative Research: Creating a conductive connection between redox enzymes.” PI on a 1-year Dept of Defense SBIR award for Innovative Concept for Detection and Identification of Biological Toxins; and co-PI on a 3-year NSF grant, “Mechanism and Design of Elastomeric Proteins.”

Krishnaswami Raja was guest editor for a thematic issue of *Anti-Cancer Agents in Medicinal Chemistry*: “Green Anti-Cancer Agents and Ayur-Biotechnology: A Smart Approach Towards Improving R&D Productivity.”

Ruth Stark (CCNY) is PI on a 5-year NSF grant, “Constructing Plant Cuticle Barriers: From Molecular Architecture to Mechanical Integrity.”

Eleanore Wurtzel (Lehman) served as Chair of the Gordon Research Conference on Carotenoids. She is an Associate Editor for *Frontiers in Plant Metabolism and Chemodiversity and Frontiers in Plant Physiology*.

Recent Publications


Update on the Decade of Science

ASRC Nanoscience Initiative

Dr. Ulijn comes to CUNY from the University of Strathclyde in Scotland, where he earned his PhD in physical chemistry and, in 2008, was appointed a full professor at the age of 34. Since then he has been running one of Europe’s leading nanochemistry labs and has served as the university’s vice dean of research. He has also formed a university spinoff company, Biogelx Ltd., where he is chief scientific officer.

At Strathclyde, Dr. Ulijn led a group of 25 researchers in developing molecular materials and systems that are inspired by biology and have unique properties, such as adaptability, molecular recognition and programmability. “These properties open up new applications in areas from biomedicine to nanotechnology,” he says. “Biology offers highly elegant, very complex solutions that may serve as inspiration to find new ways in addressing scientific challenges. I study biological macromolecular systems with a view to devising minimalistic solutions, so as to create nanotechnology systems which mimic biological functions. The goal is to produce nanotechnology materials which can change their properties on demand when required and, like human cells, adapt to new environments.”

At Biogelx, Dr. Ulijn has pioneered the development of gels made of dipeptides which can self-assemble in different ways, tailoring the stiffness of the gel to its end function, such as a soft gel for growing brain cells and a more rigid one for bone cells. Biogelx is currently working with a large pharmaceutical company and hopes to expand its emphasis from the 3D cell culture market to incorporating its products into screening-assay kits and growing artificial tissues for implant in regenerative medicine.

“The ASRC offered me the opportunity to develop a floor of a major research entity committed to pioneering, collaborative science,” Dr. Ulijn says. “It gives me access to scientists whose interests are relevant to mine and with whom I can work to extend the scope of nanoscience in general and adaptive nanotechnology in particular. The center is a portal to the whole of CUNY, the New York Structural Biology Center, and the East Coast biomedical corridor, with its possibilities for industrial partnerships.”

Dr. Ulijn sees the MMA as a key collaborator. “Macromolecular assemblies are at the core of what we do,” he says. “We share an interest with MMA scientists and engineers in how systems evolve, adapt and progress over time. We can learn a lot from the biological problems they study, and work with them on how technology can interface with the living environment.” He cites the state-of-the-art ASRC facilities as key to that collaboration, in particular NanoFab, a 5,000 square-foot cleanroom for advanced nanofabrication and characterization, which is one of the most advanced facilities of its kind on the East Coast.

Upcoming Events

5th Annual Minisymposium on Computational Methods for Three-Dimensional Microscopy Reconstruction

Thursday, August 7, 2014. CUNY Graduate Center, 365 Fifth Avenue, Room 4102, New York, NY.

For further details: http://www.dig.cs.gc.cuny.edu/workshops/Minisymposium_revised_JF1.pdf

Research Retreat, CCNY Graduate Assistance in Areas of National Need Program

September, 2014. Shepard Hall, The City College of New York

NY Structural Biology Discussion Group Winter Meeting

Thursday, January 22, 2015. NY Academy of Sciences, New York, NY. Details are provisional; check back at: http://www.nysbdg.org