

FACULTY TEAM LEADERS

Probal Banerjee (S): phosphatidylserine-membrane assemblies and receptors

Lesley Davenport (B): lipid, protein and DNA interactions; fluorescence spectroscopy

Ruel Desamero (Y) protein-small molecule interactions; Raman and IR spectroscopy

Ranajeet Ghose (C): structural biology of signal transduction, protein dynamics; NMR methodology

M. Lane Gilchrist, Jr. (C): biomolecular materials; supramolecular assemblies

Dixie J. Goss (H): studies of protein-nucleic acid interactions and regulation of transcription and translation.

Paul Gottlieb (C): assembly, replication and structure of cystoviruses; viral etiology of systemic autoimmune disease

Nancy L. Greenbaum (H): RNA structure, interactions with ions and proteins; NMR and fluorescence spectroscopy

Marilyn Gunner (C): computational electrostatics of protein recognition

Gabor T. Herman (G): image processing in biological 3D electron microscopy

Anuradha Janakiraman (C): molecular mechanisms of bacterial growth and division

David Jeruzalmi (C): DNA replication and repair: structure and function

George John (C): organic synthesis, self-assembled soft materials, and bionanotechnology

Francine Katz (C): targeting protein biochemistry for new therapeutics

Reza Khayat (C): structural studies of host-pathogen interaction and cytoskeletal regulation using x-ray crystallography and Cryo-EM

Ronald Koder (C): protein design, cofactor design, solution and solid state NMR

Themis Lazaridis (C): modeling protein-membrane interactions and molecular recognition

Louis Levinger (Y): biochemistry and molecular biology of RNA processing

Hiroshi Matsui (H): bionanotechnology, biomimetics, bioelectronics, sensors, peptide assembly, biomaterials

Fred Naider (S): receptor function; membrane transporters, protein-membrane interactions

Sebastien Poget (S): membrane protein NMR, ion channels, transmembrane receptors

Krishnaswami Raja (S): synthetic polymer-biopolymer hybrid materials; chemically modified biomacromolecular assemblies

Kevin Ryan (C): biochemistry and molecular biology of pre-mRNA processing; molecular recognition in olfaction

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Chang-Hui Shen (S): protein-nucleic acid, protein-protein interactions
Chwen-Yang Shew (S): statistical mechanics of model biological systems

Ruth E. Stark (C): protein-ligand and plant biopolymer assemblies; NMR methodology

Raymond Tu (C): peptide and biomacromolecule engineering, interfacial assembly

Eleanore Wurtzel (S): protein-mediated regulation of carotenoid biosynthesis

Yujia Xu (H): protein folding, macromolecular assembly

Zhou, Shuiqin (S): self-assembly of amphiphilic copolymers, lipids and fullerene-based surfactants

Emeritus Faculty: Tom Haines, Maria Luisa Tasayco

Campus affiliation: B – Brooklyn College; H – Hunter College; Y – York College; C – City College; S – College of Staten Island; G – CUNY Graduate Center

REGIONAL PARTNERSHIPS

The **CUNY Advanced Science Research Center** is CUNY's collaborative, interdisciplinary research center, operated by the Graduate Center and located on the City College campus. The mission of the ASRC is to elevate scientific research and education at the university through five distinctive disciplines: environmental sciences, nanoscience, neuroscience, photonics, and structural biology.

Founded by nine eminent research institutions in 1999, the **New York Structural Biology Center** (NYSBC), located on CUNY's City College campus, is a global leader in structural biology. With unsurpassed expertise and instrumentation, the NYSBC provides biomedical research services to commercial and academic clients, including high throughput gene-to-structure determination, structure-based drug design, crystallography, NMR spectroscopy, cryo-electron microscopy and protein production. This consortium shares numerous high-field NMR spectrometers operating at 500-900 MHz, a 600 MHz Dynamic Nuclear Polarization spectrometer, numerous high-end TEMs and SEMs, and access to NYX, an X-ray beamline designed to utilize the brightness of the NSLS-II, the synchrotron facility opened in 2015 at Brookhaven National Lab. The NYSBC supports projects to elucidate the role of proteins and nucleic acids in human disease and to develop fields such as structural genomics and proteomics.

The **New York Center for Biomedical Engineering** at the City College of New York, a consortium involving CUNY, Weill Medical College of Cornell University, and Mount Sinai School of Medicine, was established to serve as a national urban model for biomedical engineering training for both undergraduate and graduate students. Founded in 1994 by Distinguished Professor Sheldon Weinbaum, the Center includes 30 faculty and their teams who have worked to create a robust pipeline for African-American and Hispanic students in this specialization from high school internship through the Ph.D. degree. The NYCBE promotes interactions between the CCNY Department of Biomedical Engineering and partner clinical institutions, enabling activities such as translational technology development and the placement of CCNY BME students in research laboratories at consortium partner institutions.



Institute for Macromolecular Assemblies (MMA)

at

The City College of New York

The City College
of New York

<https://mma.ccnycunyc.edu>

CUNY Chancellor: Félix V. Matos Rodríguez

CCNY President: Vincent Boudreau

**CUNY Institute for Macromolecular Assemblies
at The City College of New York**

Ruth E. Stark, Director

Lauren Gohara, Executive Assistant

160 Convent Avenue, New York, NY 10031-9101

Phone: 212.650.8803 FAX: 212.650.6107

WHAT IS THE CUNY MMA?

Approved as an Institute of the City University of New York (CUNY) in July, 2003, the Macromolecular Assemblies Institute (MMA) builds on the research strength of campus-based faculty in Chemistry, Biology, Physics, and Engineering, on the collaborative research alliances we have made with other institutions, and on our unique laboratory capabilities. As a multi-campus entity, we have sought to become a cohesive group of researchers in an institute that constitutes more than the sum of its parts.

The MMA coordinates research investigations for both natural and engineered macromolecular assemblies of biological and medical importance, integrates graduate and undergraduate training in these areas across CUNY, and aims to expand both public and private support for these research endeavors.

Faculty and staff affiliates are based at Brooklyn College, City College, College of Staten Island, Hunter College, The CUNY Graduate Center, Lehman College, and York College.

The infrastructure of the MMA has been supported by New York State's Generating Employment through New York Science (Gen*NY*sis) program, CUNY's Office of Academic Affairs, The College of Staten Island, City College, and the National Science Foundation (NSF).

MMA research efforts are funded by the NSF, the National Institutes of Health, the Departments of Agriculture, Defense and Energy, private foundations, and infrastructural resources from the university.

RESEARCH GOALS

The specific longstanding research goals of the CUNY Macromolecular Assemblies Institute involve basic research with applications primarily to human health, energy transfer, and agriculture. Our faculty-led teams focus on macromolecular targets such as proteins, nucleic acids, lipids, and carbohydrates, with specific goals that include the following:

- to identify and characterize new molecular targets for drug design
- to delineate disease-related macromolecular signals of cellular metabolism
- to understand protein-nucleic acid interactions in animals, plants, and viruses
- to characterize the structure of macromolecular assemblies associated with microbial virulence and cellular resistance to chemotherapy
- to design polymeric biomedical materials for metabolic sensing and drug delivery
- to design self-assembled materials for light harvesting, imaging, and sensor applications
- to identify natural polymer complexes that promote resistance of plants to microbial pathogens and other environmental stresses
- to develop the technological infrastructure to attain these goals

These research goals are pursued using three distinct but related strategies: discovery of structure-function relationships for molecular machines, simulation of macromolecular structures, and bio-inspired design of functionally robust assemblies.

EDUCATIONAL PROGRAMS

GRADUATE

- CUNY Ph.D. Programs in Chemistry, Biology, Biochemistry, Physics, Chemical Engineering, Computer Science; Molecular Biophysics track in Chemistry, Biochemistry, or Physics
- Teaching and research fellowships
- Fellowships for underrepresented minorities

UNDERGRADUATE

- Summer research experiences for undergraduates
- Chemistry, biochemistry, biology, physics, chemical engineering, biotechnology, pre-medical, pre-pharmacy curricula
- Fellowships for underrepresented and economically disadvantaged students

OUTREACH ACTIVITIES

- Research-inspired K-12 Laboratory Curricula
- Summer 'Bridges to College' Workshops
- Laboratory Visits and Open House presentations
- Research Internships and Networking Luncheon

INSTITUTIONAL AND ECONOMIC DEVELOPMENT

- Research: grants, publications, seminars, symposia, focus groups, review panels
- Education: curricula, workshops, technical training, recruitment
- Technology: patents, licenses, industrial partnerships
- Jobs: R&D stimulation, new businesses, added employment opportunities.