CHARLES MICHAEL DRAIN
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EDUCATION

Ph.D. 1984-1988: Chemistry, Tufts University, Medford, MA. Thesis title: Methane Evolution from Methyl-coenzyme-M Induced by a Simple Nickel(II) Complex, and the Synthesis and Characterization of 5,10,15,20-tetrakis-(2,6-diaminophenyl) porphyrin. Barry B. Corden, advisor.

B.A. 1980: University of Missouri at St. Louis

EXPERIENCE

- Hunter College and Graduate Center of the City University of New York (CUNY)
  - Professor 2004-present
  - Associate Professor 2000-2004
  - Assistant Professor 1996-1999
- Adjunct Faculty, The Rockefeller University 1996-present
- Head of the *Nanotechnology & Materials Chemistry* Ph.D. program at CUNY 2002-2014

1993-1995 Research Associate in the laboratory of Dewey Holten, Department of Chemistry at Washington University, St. Louis

1991-1993: Guest Investigator in the Laboratoire Supramoléculaire of Jean-Marie Lehn, Université Louis Pasteur, Strasbourg, France (on leave from Rockefeller Univ.)

1988-1991 Postdoctoral Associate in the Photobiology & Photophysics laboratory of David Mauzerall at the Rockefeller University, New York

1983-1984 Promoted to Lab Manager at MIDCO Products Inc., St. Louis. Two patents resulted from work during this time.

1981-1983 R&D Chemist at MIDCO Products, Inc., St. Louis

AWARDS & HONORS

2015: nominated for: Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring (PAESMEM)

2012: Outstanding Undergraduate Mentor in the Sciences at Hunter College, I^3 project

2007: L. Stokes Alliance Mentoring Award, for Diana Samaroo, Ph.D.

2004: New York Academy of Sciences, "*Science in the City*" honoree

2001: Foresight Institute Feynman Prize Finalist, in Nanotechnology

1997: Eugene Lang Junior Faculty Development Award, Hunter College: for promising junior faculty research

1996: Schuster Award, CUNY: for outstanding efforts in teaching

1996: Presidential Faculty Incentive & Teaching Award, Hunter College: for developing an integrated math, physics, biology, and chemistry course for 'at risk' high school students

1994: Distinguished Alumni Award, University of Missouri, St. Louis (Chemistry)

1994: Bioelectrochemical Society award to young investigators at Gordon Research Conference in Irsee, Germany. "Electrostatics inside membranes"

1992: Inst. Biophysics, Szeged Hungary Distinguished Lecture series: 2-day course in biological energy transduction

1991: Chateaubriand Fellowship, sponsored by the French Embassy

1990: Student Presentation Award: 10th International Biophysics Congress, Vancouver, Canada

1989: Galvani Prize: Bioelectrochemical Society, Pont-à-Mousson, France. "Photogating of ionic currents across lipid bilayers"

1988: Scholarship to the International School of Biophysics, Erice, Italy

1985: duPont Fellowship for Academic Excellence: Tufts University, Medford

1978-80: MIDCO Products Inc. Academic Scholarship, University of Missouri at St. Louis

PROFESSIONAL ACTIVITIES

Memberships: American Chemical Society, American Association for the Advancement of Science, New York Academy of Sciences

TEACHING EXPERIENCE

Undergraduate: General Chemistry (I & II), Analytical Chemistry, Instrumental Analysis, Inorganic Chemistry, Organic Chemistry, Biophysics Lab, Honors Research, Science 200 (introduction to scientific methods, presentations, ethics, etc.)

Graduate (Ph.D. level): Inorganic Chemistry, Introduction to Nanotechnology, Chair or co-chair Nanotechnology & Materials Chemistry subdiscipline in CUNY Chemistry PhD program 2002-2012

COLLABORATIONS

present

1. **Lynn Francesconi** (Hunter) and I have collaborated for 10 years on various inorganic chemistry projects and radiochemistry, especially using polyoxometalates
2. SPM of (metallo)porphyrins and assemblies of (metallo)porphyrins on a variety of surfaces. Collaboration with **James D. Batteas** (Texas A & M). The goal is to probe the photonic properties of single molecules and supramolecular materials of these chromophores as a function of surface, mode of attachment, and organization.
3. Solar cell design and assessment, nanoparticle characterization in collaboration with **Chuck Black** and the center for Functional Nanomaterials at Brookhaven National Labs.
4. **Amit Aggarwal** and **Sunaina Sing** (LaGuardia, CUNY) on the development of new porphyrinic materials.
5. **Moritz Kircher** and **Jan Grimm** (Memorial Sloan Kettering Cancer center) applications of nanotechnology and photonics to cancer theranostics.

previous

6. Probing the mechanism of self-assembly of porphyrinic systems on surfaces. Collaboration with **George Flynn** (Columbia). The goal is to examine the kinetics of self-assembled porphyrin arrays (both metal ion and H-bond assembled) on surfaces from their component parts to probe surface and dimensionality effects on self-organizing processes.

7. Photophysical properties of porphyrins and porphyrinoids compounds in collaboration with **C.-Y Nam** (Brookhaven National Labs) and in terms of 2-photon microscopy with Sushmita Mukherjee (Weill Cornell).
8. Dye sensitized solar cells collaboration with **M. Durstok** at Air Force research labs.
9. Work with **Israel Goldberg** (Univ. Tel Aviv) continues on the comparisons between solution structure to surface structure to crystal structure and how to correlate these.

RESEARCH GRANTS

21 years of continuous funding from NSF, funding from NIH, DoD, and other agencies. Total funding >$8,000,000

SERVICE to Hunter College and the City University of New York

2013-present: Chair, Department of Chemistry, Hunter College

2001-present: member of the CUNY Ph.D. program's executive committee

2009-2013 CUNY chemistry doctoral student admissions committee

2008: chair of the CUNY chemistry doctoral student admissions committee

2002-present: Chair or co-chair of the *Nanotechnology & Materials Chemistry* sub-discipline in the Chemistry Ph.D. program at CUNY

2006-2008: restructuring of the doctoral programs in the sciences at CUNY: reorganization of the support, administration, and the education/training of doctoral programs in chemistry, biology, physics, and biochemistry

2006-2008: CUNY Advanced Science Center design and implementation advisory panel

2006-2007: CUNY science ethics and misconduct review panel

2002-present: Steering committee for the CUNY *Institute for Macromolecular Assemblies*

2004-present: CUNY *Center for Advanced Technologies: photonics* member.

2001-present: Hunter College Department of Chemistry & Biochemistry "Personnel & Budget Committee" (tenure, promotion, budget, etc.)

2001-present: CUNY Ph.D. program in Chemistry Executive Committee (administers the Ph.D. program in chemistry for the consortia of CUNY schools)

2002-2007: Hunter College Research Centers at Minority Insitutions (RCMI) steering, recruiting and facilities committees

2001: Developed "Introduction to Nanotechnology" a required graduate level course for the new discipline, *vide infra*, serve as pedagogical consultant for the course

1999: Nanotechnology and Materials Chemistry Ph.D. program: Though conceived as an interdisciplinary program, we introduced it as a discipline in chemistry as it is the most facile way to get a new program started at CUNY. The intent is to eventually make the Nanotechnology and Materials Chemistry Program semi-autonomous so that students from any of the sciences and engineering can freely participate in a truly interdisciplinary program without the restrictions imposed by any one of the traditional science and engineering programs. Thus, they can tailor their courses and research to their interests and needs in nanotechnology. > 40 students are enrolled in the NMC Program as of the Fall, 2007 semester.

1999: Established the annual "*Hunter College Chemistry Distinguished Alumni Award*," and the *Antoine Saugrain Lecture/Award*, both sponsored by the Foundation A. Saugrain. For example, the 1999 recipient of the Alumni Award was Alice Stoll and included a lunch discussion on the changing roles of women in chemistry from the perspective of "Five Generations of Women in Chemistry at Hunter College." Recipients of the A. Saugrain Award include Nobel Laureates and other world-renown scientists.

1998: Assisting in the development of new physical and analytical chemistry laboratories; my focus is on materials science. Six new state-of-the-art experiments have been put together, or are under development.

1997: Developed a course on Supramolecular Chemistry for CUNY. Several of these lectures have been incorporated into my graduate and undergraduate courses.

1996: Participant in a pilot study to redesign undergraduate junior year evaluations at CUNY. These obligatory exams are a crucial step for undergraduates.

1997: Developed curriculum entitled "Investigations in Chemistry," an integrated science and math curriculum for academically 'at risk' high school students with Hunter College masters in education student

1989: Volunteer teacher of an advanced course for seniors entitled "Chemistry & Physics of Some Biological Systems" at Xavier High School, New York

1989: Symposium Organizer: "Biological Charge Transfer: from Photosynthesis to Physiology" at The Rockefeller University, New York

Ad Hoc Committees: *Present:* Graduate general exam; Graduate thesis (at CUNY, Columbia, Rockefeller, Rutgers, & Univ. of Utrecht, The Netherlands, University of Strasburg, France); *Previous:* Hunter College Senate, 1996, departmental seminar, Fall 1996; Undergraduate teaching; CORE course advisory committee

RECENT PRESENTATIONS

Over 100 invited talks and meeting presentations

TEACHING

In terms of **high school chemistry**, I have developed two chemistry/science courses. Together with a Hunter College education graduate student, Z. Zbaida, class of 1997, we developed a year-long course in science for New York City high school students considered 'at risk' (at risk of not graduating for a variety of reasons such as age limits, disciplinary problems, etc.). The overall approach of this course is to begin with an oftentimes dramatic demonstration followed by discussion of what was observed, hypotheses on the causes of the phenomenon, and then a discussion of the science underlying the demonstration and the reformation of development of a new hypothesis. This class has been taught in a high school in Brooklyn for 3 or 4 years with the hopes that it can be used in other New York City high schools for classes of at risk students. In 2007 we updated the materials. The second course is a lab course developed at Xavier High School that focuses on both biochemical and materials chemistry.

GRADUATE STUDENTS

Year	*Name, discipline (supported by)*	*present employment*
Current		
2013:	Waqar Rizvi (organic)	
2016:	Qize Zheng (nano)	
2017:	Gia Berisha (nano)	
Past		
2000:	Xianchang Gong, Anal. (NSF)	Started his own biotech business
2001:	Xinxu Shi, org. (NSF)	Memorial Sloan Kettering
2001:	Fotis Nifiatis, physical org. (NSF)[A]	Prof. Montclair State

2002:	Tatjana Milic, anal./nano (NSF)	Albany Molecular Research
2004:	Xin Chen, biochem. (NIH)	Arvinas, Inc.
2004:	Kai Cheng, org. (NSF)	N. Shore Hospital, NY
2005:	Chang Xu, polymer (NSF, NIST, Israel-US)	U. Mass Amherst
2005:	James Helt, polymer (IGERT, NSF, NIST)	entrepreneur, US Aerospace
2006:	Alexander Falber, inorg. (NSF, IGERT)	founder, Algae Enterprises, Australia
2007:	Diana Samaroo,[B] biochem (AMP, IGERT, NSF)	Prof. NYC Tech.
2007:	Gabriela Smeureanu, anal. (NSF)	Lecturer, CUNY
2008:	Giorgio Bazzan, anal. (NSF)	Staff scientist, Air Force Labs
2009:	Alessandro Varotto, nano (NSF)	Loyola Marymount University
2009:	Sebastian Thompson Parga,[B] biochem. (NIH)	visiting Prof. Northwestern Univ.
2010:	Jennifer Vance, nano (CUNY)	Prof. LaGuardia Community College
2010:	Ivana Radivojevic, Nano (NSF)	Visitn Prof. Boston College
2011:	Amit Aggarwal, anal. (NSF)	Prof. LaGuardia Comm. Col.
2011:	Sunaina Singh, org. (NSF)	Prof. LaGuardia Comm. College
2011:	Jacopo Samson, Nano (NSF)	Lecturer CUNY
2012:	Matthew Jurow, nano (NSF)	Lawrence Berkeley National Lab
2016:	Matthew Wall, nano (NSF IGERT)	post-doc U. Washington
2016:	Travis Schaffer (NSF IGERT)	post-doc Stanford
2016:	Christopher Farley (NSF)	Visiting Professor, Hunter College
2017:	Junior Gonzales (NIH)	postdoc, Memorial Sloan Kettering

[A]Dr. Nifiatis won the 1998 Foresight Institute Distinguished Student Award in Nanotechnology for his contribution to the work on the nonameric porphyrin array: http://www.foresight.org/Conferences/MNT6/release.html [B] Underrepresented minority,

MASTERS STUDENTS

2013-2015: David Arenivar[B]

POSTDOCTORAL STUDENTS

Year	*Name, (supported by, location)*	*present employment*
2000-2001:	O. Athilakshmi (NSF, Rockefeller)	U. IL, Urbana
2000-2002:	Isabelle Sylvain (NIH, Hunter)	returned to France, Elf
2000-2003:	Ning Chi (Israel-US, Hunter, Staten Island)	teaching at Rutgers
2002-2004:	Jayne Garno (CUNY, NRC Fellow at NIST)	Faculty, LA State U.*
2005-2007:	Mikki Vinodu (NIH, CUNY)	Faculty, Kuwait University
2007-2008:	Joao Tome (NIH)	Faculty, Univ. Averio, Portugal
20010-2013:	Xinxu Shi	Memorial Sloan Kettering
2013-present:	Dinesh K Bhupathiraju	

Other lab members

2005:	Visiting Professor: Greg Edens, Long Island University (NIH, Rockefeller)
2002-2003:	Technician: Sandeep Patel, Ph.D. from GA Tech., NIH strategic planning
2010-2012:	Technician: Brian Hageman

*Prof. Garno won a 2009 Presidential Early Career Awards for Scientists & Engineers, the highest honor given by the U.S. government to scientists and engineers at the beginning of their careers, worked with Dr. James Batteas at NIST

Undergraduate Researchers

Name		**Post-CUNY**
Alex Vasenko	Co-authorship	Dentist
Venessa Ruta[A]	Co-authorship	Ph.D. Rockefeller U. Postdoc Columbia
Elizabeth Manejias[B]		Physician (SUNY Stony Brook)
Melissa Bailey[B]		Ph.D. SUNY
Lisa Robinson		Ph.D.
Vinita Tiwari		Physician
Suhel Ahmed		Physician
Kareem Eldar		Physician
Lincoln Roland[B]		Medical School
Bara Reyna[B]		Ph.D., U. Texas, Austin
Dianna Samaroo[B]	Co-authorship	Ph.D. CUNY, postdoc Cornell
William Wooten[B]		BA student, Hunter
Shabnan Nia	Co-authorship	Masters CUNY
Brent Fabric		
Roger Lefort[B]		Ph.D. Columbia U.
Milisa Hilaire[B]		Ph.D. student, CUNY
Margareta Sorensen		Ph.D. student, Rockefeller U.
Reggi Roy		Technician at Rockefeller U.
Heather Sommers [B]	Co-authorship	Physician
Vladim Avulov		Physician
Shawn Barker[B]		Industry
Randy Jackson[B]		Grad. school U. Conn.
Tatyana Groysman	Co-authorship	Medical school
Marina Matatova		Medical school
Ngee Thai	Co-authorship	Grad. School
Bassam Saad		Medical School
Diran Arijeloye[B]	Co-authorship	*ACS Scholar,* graduate school
Rachel Alfie		Ph.D., U. Mass. Lowell, Chemist Haartz Corporation
Noemi Belis[B]		
Michael Favilla	Co-authorship	Finishing BA, part time CUNY
Sarnia Laurent[B]		Graduate school
Gianluca Arianna	Co-authorship	MD-PhD U. Conn.
Eric Malave[B]	Co-authorship	CCNY Engineering
Waqar Rizvi[D]	Co-authorship	Graduate school CUNY
Meroz Qureshy[D]	Co-authorship	Pharmacy School
Armond Pietrocarlo[B]		Graduate school
Aaron Dolor[BCD]	Co-authorship	Grad. school UCSF
Raihan Saleh[CD]	Co-authorship	NYU Chemical engineering
Cesar Pabon[BCD]	Co-authorship	Started buisiness
Nicholas Ravvin		Leadership Alliance support
Nicholas Lease	Co-authorship	SPUR, went to Rutgers
Gabrielle Benitez[B]		SPUR, went to Columbia
Eric Gervey		Medical school

David Nissenbaum		NC State chemistry
Abdul Salam		Cornell biochemistry
Viacheslav Manichev	Co-authorship	Rutgers chemistry
Dillon Sooknanan[B]		
Peter Vitale	SPUR, Iona College	Medial school
Olivia Monaco	SPUR, Fordam Univ.	Graduate school
Daniel Hart	SPUR, Hunter Coll.	Medical school
Juliya Matolina	co-authorship	Graduate school
Danny Swift	co-authorship	Pomona College
Saul Penaranda	co-authorship	Hunter College
Arman Akter		
Bianca John	co-authorship	Graduate school
Gia Berisha	co-authorship	Graduate school, CUNY
Pablo Figueroa[B]	co-authorship	Graduate school
Patrick Moy		Graduate school
Mark Maranan[B]		
Bibi Begum		
Bleron Samarxhiu		Graduate school
Kirran Tiwari	co-authorship	Dental school
Philip To	co-authorship	Graduate school
Emaad Khwaja	co-authorship	MD-PhD program
Saim Siddiqu	co-authorship	
Muntasir Sayeedi		

HIGH SCHOOL Students (Sponsored by ACS Project Seed, NY Academy of Sciences, Harlem Children's Society): Raquel Look, Ben Rothschild, H.A. Bodah[B] (High School Teacher, Dreyfus Fdn. Partners in Science), Robert Negron,[B] Avani Kothary, Michelle Li, Anthony Ho, Yelena Shapiro, Grace Ro, Oliver Yang[E] , Karen Watson, Candido Gude,[B] Ruchi Bhargava, Samantha Dannenberg, Sean Feiner[E], Raihan Saleh (Sigma Xi first place winner 2008),[B,C,D] Erik Malave,[B,C] Gianluca Airanna[B,C] (NY Acad. Sci. Ezra Levy High School Science Award – 2009), Kay-Kemakorn Ithisuphalap[C] (Intel Science Competition finalist, 2010); Parbat Chapagai, Daniel Swift,[C,D,E] Susmita Paul, Vahagn Stepanyan, Priscilla Varghese[B], Arnold Djondo,[B] Amior Schmidt (2012-2013), Alei Rizvi, Nasser Ghaffar[B] and Niles Ghaffar[B]

[A] Goldwater fellow. Ruta's Ph.D. thesis is on K^+ ion channels in the lab. of Prof. MacKinnon at Rockefeller U. and she had three papers (two in *Nature*) and for this work on ion channels, MacKinnon won the 2003 Nobel Prize in chemistry [B] Underrepresented minority in STEM, [C]Co-author, [D]2 or more summers/years, [E]Intel semifinalist

OTHER ACTIVITIES/OUTREACH

International Year of Chemistry

As part of the celebration of the International Year of Chemistry, graduate student Jacopo Samson from Hunter College of the City University of New York and I participated in the "pH of the Planet" experiment with over 250 seventh grade students from Readington Middle School in Hunterdon County, N. J. During the last week of April, the students brought in water samples from wells, lakes, rivers, and streams to test the pH. This was written up in the local newspaper and posted on the

American Chemical Society blog on the event. See: "Chemistry Ambassadors put U.S. on the world map – the Global Water Map"
http://portal.acs.org/portal/acs/corg/content?_nfpb=true&_pageLabel=PP_ARTICLEMAIN&node_id=75&content_id=CNBP_029516&use_sec=true&sec_url_var=region1&__uuid=67c1ff64-4f0a-4621-ad0a-8d76148baca4

NanoDays 2012

I applied for and received a NanoDays kit. See http://www.nisenet.org/nanodays : *" NanoDays is a nationwide festival of educational programs about nanoscale science and engineering and its potential impact on the future. NanoDays events are organized by participants in the Nanoscale Informal Science Education Network (NISE Net)*" We did experiments at Holland Brook School in Readington, NJ with over 50 4th graders and the Middle School with over 160 8th graders. Students rotated between four stations every 10 minutes so that they could do the following experiments: (1) make gummy worms by mixing sodium alginate with $CaCl_2$; (2) make a hydrogel from the sodium polyvinyl acetate; (3) look at the reflection of a dipper rash ointment with large ZnO particles, which is white, versus nanoparticles of ZnO in sunscreen, which is clear; (4) look at a blue morpho butterfly versus a yellow moth. (5) steel balls bouncing on stainless steel versus amorphous metal – the "atomic trampoline."