

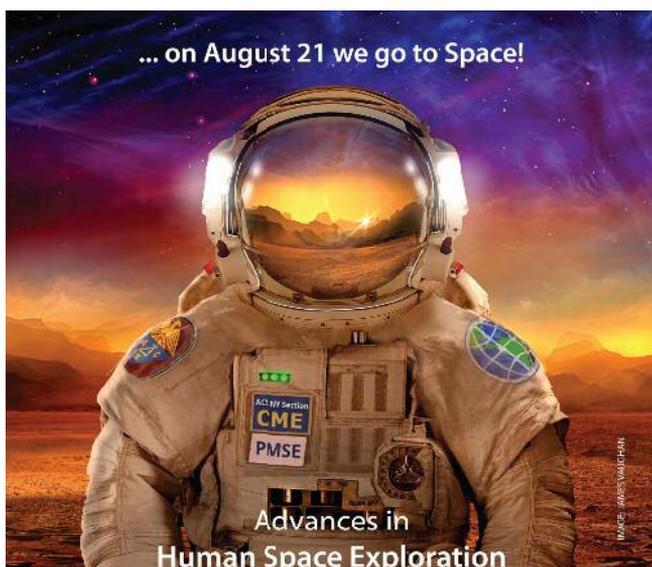
THE Indicator

SEPTEMBER 2018

Vol. 99 • No. 7

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AUGUST 21, 2018 Chemical Marketing & Economics Group Lectures at the 256th ACS National Meeting & Exposition



ACS President Recommends PMSE Symposium - Westin Boston Wft
Chemistry, Industry Technology & Jobs. info: www.cmeacs.org
CME Lectures 8/21 4-6 pm*

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R. Langer



E. Carter



J. Green

* Limited free reception tickets and ACS Journal T-shirts

Join this full day program packed with cutting edge chemistry and speakers including Michael Meador, NASA Glenn, Jillian Buntak, U of Alberta; Joseph Wang, UCSD; Paul Weiss, UCLA; Micael Salter, UCSD; Ropoberto Advincula, Case Western; Randall Lee, U of Houston; Younan Xia, Georgia Tech; Bibi Campos-Seljo, C&EN; David Bearden, NASA JPL; Joe Cassidy, Aerojet Rocketdyne and others.



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See complete program on pages 5 - 18.

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THIS MONTH IN CHEMICAL HISTORY

Harold Goldwhite, California State University, Los Angeles • hgoldwh@calstatela.edu

I cannot resist the urge to purchase mid-19th. Century chemistry textbooks for a lower price than I would have to pay for a quality paperback. The reason is not hard to discern. It was stated clearly by Thomas Kuhn in his "The Structure of Scientific Revolutions", an influential book on the history of science published in the middle of the twentieth century. Kuhn's thesis is that most scientists engage in what he called "normal science" based on the accepted views, the paradigms, of their times. And paradigms are firmly ensconced in textbooks which are therefore a reliable guide to mainstream scientific thinking of the period in which they are published.

All this is prelude to the subject of this month's column, "Kane's Chemistry edited by Draper" published in 1845. Kane and Draper are so significant in the history of chemistry that much of this column will be about these two scientists, leaving the examination of their textbook to a subsequent essay. Robert John Kane was born in Dublin in 1809. His father had participated in the Irish rebellion of 1798 and had left for France where he began the study of chemistry. Returning to Ireland he established a factory making sulfuric acid. Like father, like son. Robert Kane learned his early chemistry at his father's factory and attended lectures at the Royal Dublin Society, publishing his first paper at the age of 19. Entering Trinity College, Dublin to study medicine he graduated with an M.D. in 1834, meanwhile working at a local hospital. He was appointed Professor ("The Boy Professor") at Apothecaries Hall in Dublin in 1831, at age 22!

Kane's first book, "Elements of Practical Pharmacy" was published at this time and earned him election to the Royal Irish Academy. His research at this time, in the mainstream of current chemistry, involved radical theory in organic chemistry, and he proposed the novel ethyl radical. He moved to Giessen in Germany to work with Liebig, the originator with Woehler of radical theory. In 1841 – 1843 the three volumes of his "Elements of Chemistry", the basis of the book I purchased, were published. He also wrote a comprehensive report on the industrial resources of Ireland. His prestige by now was such that he was appointed one of the Commissioners who studied and reported on the Great Irish Famine. He became director of the Museum of Irish Industry in Dublin, and was appointed as the first President of Queen's College, Cork. He was knighted by Queen Victoria in 1846. His further honors included National Commissioner for education; President of the Royal Irish Academy; and first Chancellor of the new Royal University of Ireland. He died in 1890.

And what about John William Draper, Kane's American editor. He is among the most distinguished American scientists of the 19th. Century. He was born in Lancashire, England in 1811 and his father was a Wesleyan Methodist clergyman. Draper studied chemistry at University College, London with Edward Turner. When his father died in 1831 Draper's family all moved to Virginia where he hoped to get a teaching position. Although that did not happen Draper still set up a research laboratory and published 8 papers before entering medical school. He graduated from the School of Medicine of the University of Pennsylvania and then began teaching at Hampden-Sydney College in Virginia. He was a founder of the Medical School of New York University and was both Professor and President of that school. He was Professor of chemistry there from 1840 to 1881. In 1876 to 1877 Draper was the first President of the ACS.

Draper was an early pioneer in the chemistry of photography and made some of the earliest portrait photographs. His photograph of the moon, the second one made, was a sensation at the time. His writings were especially influential. In addition to the edited textbook mentioned above he wrote "The Intellectual Development of Europe" published in 1862; a 3 volume "History of the American Civil War" published from 1867 – 1870; and his most famous and controversial book: "A History of the Conflict between Religion and Science" published in 1874. This book was translated into ten languages and was reprinted 50 times in its American edition. Draper was elected to the National Academy of Sciences in 1877. He died in 1882.

As I forecast above, the accomplishments of the two authors have filled this column. The examination of the textbook must wait to a subsequent column.

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The monthly newsletter of the New York & North Jersey Sections of the American Chemical Society. Published jointly by the two sections.

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Address advertising correspondence to Advertising Manager. Other correspondence to the Editor.

September Calendar

NEW YORK SECTION

Tuesday, August 21, 2018

Chemical Marketing & Economics Group
See pages 5-18.

Thursday, September 13, 2018

NY Section Society for Applied Spectroscopy
See page 19.

Friday, September 14, 2018

NY Section Board of Directors Meeting
See page 19.

Tuesday, September 25, 2018

Biochemical Topical Group
See pages 19-20.

also

Tuesday, October 6, 2018

Westchester Chemical Society
See pages 20-21.

Saturday, October 27, 2018

Teaching Students with Disabilities
See page 22.

October 2018

NY Section Society for Applied Spectroscopy
See page 19.

Tentative Tuesday, November 6, 2018

Westchester Chemical Society
See page 21.

November 2018

NY Section Society for Applied Spectroscopy
See page 19.

Wednesday, December 5, 2018

NY Section Society for Applied Spectroscopy
See page 19.

Thursday, December 6, 2018

Westchester Chemical Society
See page 21.

NORTH JERSEY SECTION

Monday, September 17, 2018

North Jersey Executive Committee Meeting and SEED Student Symposium
See page 31.

Monday, September 24, 2018

NMR Topical Group Seminar
See pages 31-32.

Wednesday, September 26, 2018

North Jersey Chromatography Group Seminar
See page 31.

also

Saturday, October 20, 2018

Chem Expo at Liberty Science Center
See page 33.

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**Deadline for items to be included in the
October 2018 issue of *The Indicator* is**

August 28, 2018

***The Indicator* is posted to the web around the
15th of the previous month at**

www.TheIndicator.org



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Cutting-edge developments in the chemical sciences to advance human space travel to Mars and translate them into new knowledge for the benefit of Earth and its people.

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8:30 am – 11:50 am

Advanced Materials & Manufacturing Methods, Organic Solar Cells, Wearable Electrochemical Sensors, Nano-Scale Sensing Devices

1:00 pm – 3:45 pm

Robust Polymer Brushes Grafted from Gold Surfaces, Nanomaterials for Aerospace, Industry Panel the Quest for more Capability in Smaller Systems, Jobs. Aerojet Rocketdyne, JPL

4:00 pm – 6:00 pm

CME Lectures and Leadership Awards: featuring leaders visionary Dr. Robert Langer, Princeton dean of engineering Dr. Emily Carter, NASA Chief Scientist James Green.

7:00 pm – 9:00 pm *CME Reception*.

ACS Primary Sponsoring Division: Polymeric Materials Science & Engineering (PMSE) . *Organizers*: Qinghuang Lin, George Rodriguez, Charles Brumlik



Co-Sponsors: 2018 ACS President Peter Dorchout, 2017 ACS President Allison Campbell, 2016 ACS President Donna Nelson, the Chemical Marketing & Economics Group of the ACS New York Local Section (CME), NASA, the ACS Technical Divisions ANYL, BIOT, BMGT, CATL, CHAS, CHED, CINF, COLL, COMP, ENVR, FLUO, GEOC, INOR, NUCL, PHYS, PMSE, SCHB, and the MPPG Multidisciplinary Program Planning Group.

The CME Lectures includes limited complimentary ACS Journal T-shirts.

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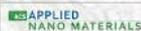
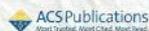
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Morning Research Session (8:30 - 11:50) - Grand Ballroom D			
8:30	Qinghuang Lin	IBM Master Inventor, PMSE Past Chair	Opening Remarks
8:35	Michael A. Meador	NASA Glenn, POLY Vice Chair	Needs and Opportunities in the Development of Advanced Materials and Manufacturing Methods for Future Long-Duration Human Space Exploration
9:05	Jillan M. Buriak	U of Alberta, Chemistry of Materials Editor-in-Chief	Optimization of organic solar cells through experimental design and machine learning
9:35	Joseph Wang	UCSD, ACS Nano Editorial Advisory Board	Wearable Electrochemical Sensors
10:05	Intermission		
10:20	Paul Weiss	UCLA, ACS Nano Editor	TBD
10:50	Michael Salor	UCSD, ACS Sensors Associate Editor	Harnessing the Chemistry and Physics of Silicon Nanomaterials for Micro and Nano-Scale Sensing
11:20	Rigoberto Advincula	Case Western, Reactive and Functional Polymers Editor	Polymers and manufacturing: a space flow chemistry perspective
11:50			End
Afternoon Research & Industry Session (1:00 - 3:40) - Grand Ballroom D			
1:00	Peter Dorchout	ACS President	Opening Remarks
1:05	Charles Brumlik	Nano-Biz Principal, ACS NY CME Vice Chair	Introduction
1:10	T Randall Lee	U of Houston, Applied Nano Materials Deputy Editor	Robust and thick polymer brushes grafted from gold surfaces using bidentate thiol-based initiators
1:40	Younan Xia	Georgia Tech, Applied Nano Materials Editorial Advisory	Advanced nanomaterials for aerospace and related applications
2:10	Intermission		
2:25	Bibi Campos-Sejor	C&EN Editor-in-Chief	Panel Discussion
3:25	David Bearden	NASA JPL Senior Capture Lead & Strategist - Office of	NASA JPL overview and the quest for more capability in smaller systems
	Joe Cassidy	Aerojet Rocketdyne	Space Executive Director, Explore Mars Board Member
3:40			End
Afternoon CME Lectures & Awards (4:00 - 6:00) - Grand Ballroom A			
4:00	Tom Connelly	ACS CEO	Opening Remarks
4:10	George Rodriguez	CME Past Chair	Introduction
4:15	Robert Langer	MIT Koch Institute Professor	Exploring biomaterials, delivery systems, and tissue engineering
4:50	Emily Carter	Princeton Dean, Engineering and Applied Sciences	Sustainable production of fuels and chemicals
5:25	James Green	NASA Chief Scientist	Space: The Future of Transportation
6:00			End
Evening CME Reception (7:00 - 9:00) - Harvard Ballroom 3 (Westin Boston Waterfront)			

The CME Lectures includes limited complimentary ACS Journal T-shirts (ACS Applied Nano Materials, ACS Sensors, ACS Nano)

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4:00 PMSE Opening Remarks. T. Connelly, ACS CEO.

4:05 PMSE Introduction. G. Rodriguez, Past CME Chair.

4:10 PMSE Exploring biomaterials, delivery systems, and tissue engineering.
R. Langer

Abstract: The advancement of civilization and the exploration of space will depend on cutting-edge developments in life science monitoring and healing systems, devices and other technologies that allow humans not only to survive but to be highly productive in the harshest conditions imaginable for an extended period of time. This talk will explore cutting-edge developments in the following areas:

- Developing controlled release systems
- Creating new approaches for delivering drugs such as proteins and genes across complex barriers in the body such as the intestine, the lung, and the skin
- Researching new ways to create tissue and organs including creating new polymer systems for tissue engineering

4:45 PMSE Sustainable production of fuels and chemicals. E. Carter

Abstract: I wrote this abstract the day after a scientific giant of our day, the great cosmologist Stephen Hawking, died. To honor his memory, I will speak about potential technological advances in materials science, nanoscale optics, and electrochemistry that could allow us to respond to Dr. Hawking's clarion call: "It is time to explore other solar systems...humans need to leave Earth." To do so probably represents - next to rendering fusion power commonplace - the greatest set of technological challenges humankind has ever faced. Among them are ones from the domain of chemistry: we will need to create a virtuous chemical cycle, exploiting energy from sunlight and molecules in air, water, and carbon dioxide to synthesize fuels and chemicals needed to sustain life off planet Earth. I will give examples from my own research - developing and applying quantum mechanics techniques to sustainable energy technologies - aimed at understanding and designing new materials and processes that will create that virtuous cycle needed by future generations.

1-min ACS Video: [Before we go to Mars](#)

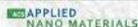
5-min C&EN Video: [Chemistry and Mars Exploration](#)

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5:20 PMSE Future in Space Supported by Chemistry and Nano Technology. J. Green

Abstract: Developed by James L. Green, Louis Barbier, Tara Ruttlely, Xiaivin Raymond. NASA's Office of Chief Scientist.

NASA's ambitious future plans are to create a sustainable program of human and robotic exploration with commercial and international partners to enable human expansion across the solar system. This program supports the return of humans to the Moon for long-term exploration and utilization, followed by human missions to Mars in our lifetimes. In order to accomplish these objectives, NASA invests about \$800M in 15 distinct technology areas (TAs) including space power and energy storage, nanotechnology, materials and structures, and thermal protection systems. Nanotechnologies and chemistry play a large role in many of these investments, including (for example): structural engineered nanomaterials (lightweight metal-matrix composites), high-efficiency radiation hard solar cells, high-performance energy storage devices (such as supercapacitors), and nanotube arrays for biochemical sensing. The latter can be used for both health monitoring and biomarker detection. Rapid, low-cost bio-detection devices will be increasingly important as we move to detect life on other planets, icy moons, and myriad solar system bodies. Technologies like these are also evaluated for their capabilities in enabling future exploration beyond low-Earth orbit (LEO) through testing on the International Space Station (ISS). Within the sustained microgravity environment of ISS, investigations performed in chemistry, materials, and nanotechnology contribute to the development and on-orbit demonstration of new tools for future exploration, such as air and water recycling systems, propellant management systems, new space vehicle and spacesuit materials, and volatile organic trace gas management systems.

As we embark on humans exploring the Moon and Mars, the more important it will be to convert extraterrestrial resources to generate required products, an approach called in-situ resource utilization (ISRU) for which chemistry is essential science. Sunlight for power is, of course, one the common form of ISRU, but now critical space-based resources that are essential for the success of long-duration missions includes accessing water, oxygen, and methane resources, which can be derived from carbon dioxide on Mars atmosphere and water deposits from lunar and Mars regolith. The development and testing of ISRU technologies for searching and processing space-based resources is a critical component in NASA's exploration plans and will eventually get humans to the Moon and Mars. Finally, it is important to also realize that chemistry will always play an essential role in robotic instruments that tease out the chemical composition of the Moon and Mars that give us the knowledge of how these bodies are created and evolved.

5:55 Final remarks and adjournment.

1-min ACS Video: [Before we go to Mars](#)

5-min C&EN Video: [Chemistry and Mars Exploration](#)

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Award for Historic Scientific Achievement

Robert Langer, PhD, is the David H. Koch Institute Professor at MIT (there are 13 Institute Professors at MIT; being an Institute Professor is the highest honor that can be awarded to a faculty member). His h-index of 233 is the highest of any engineer in history and he has over 1,260 issued and pending patents worldwide. His patents have licensed or sublicensed to over 300 companies.

Professor Langer has written more than 1,400 articles. His many awards include the US National Medal of Science, the US National Medal of Technology and Innovation, the Charles Stark Draper Prize (considered the engineering Nobel Prize), Albany Medical Center Prize (largest US medical prize), the Wolf Prize for Chemistry, the 2014 Kyoto Prize and the Lemelson-MIT prize, for being "one of history's most prolific inventors in medicine." Langer is one of the very few individuals ever elected to the National Academy of Medicine, the National Academy of Engineering and the National Academy of Sciences.



Award for Interdisciplinary Innovation

Emily A. Carter, PhD, has an outstanding record engaging scientists in many disciplines as well as applying accurate, efficient quantum mechanics methods that enable discovery and design of materials for sustainable energy. Dr. Carter is Dean, School of Engineering and Applied Science, Gerhard R. Andlinger Professor in Energy and the Environment, Professor of Mechanical and Aerospace Engineering and Applied and Computational Mathematics.

Professor Carter received her B.S. in Chemistry from UC Berkeley in 1982 and her Ph.D. in Chemistry from Caltech in 1987. She spent 16 years at UCLA as a Professor of Chemistry and Materials Science. At Princeton University she was the Founding Director of the Andlinger Center (2010-2016). The author of over 360 publications, she has delivered over 500 invited and plenary lectures and serves on several advisory boards. She has received awards from the American Chemical Society, the American Physical Society, the Institute of Physics, the American Association for the Advancement of Science, the Italian Chemical Society, the German Chemical Society. Professor Carter was elected in 2008 to both the American Academy of Arts and Sciences and the National Academy of Sciences, and in 2016 to the National Academy of Engineering.

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Award for Propelling Space Science

James Green, PhD, has a brilliant record of expanding globally the access to scientific research about space and planetary exploration. He developed and managed the Space Physics Analysis Network that provided scientists worldwide with rapid access to data, to other scientists, and to NASA computer and information resources. Dr. Green is NASA's Chief Scientist who focuses on strategic science objectives and contributions to the science communities worldwide.

Dr. Green was previously the director of the Planetary Science Division at NASA Headquarters since 2006. During his 12 years in this role, he managed numerous successful missions from Mercury to Pluto that have ushered in a golden age of planetary exploration. These missions include: the Lunar Reconnaissance Orbiter, Mars rovers Spirit, Opportunity and Curiosity; and the New Horizons mission to Pluto and beyond just to mention a few.

Dr. Green received his Ph.D. in Space Physics from the University of Iowa in 1979 and began working at NASA's Marshall Space Flight Center in 1980. Over the years he became head of the National Space Science Data Center at Goddard Space Flight Center, Chief of the Space Science Data Operations Office and Chief of the Science Proposal Support Office. He has written over 115 peer reviewed scientific papers involving the Earth's and Jupiter's magnetospheres and over 50 technical articles on data systems and networks. Dr. Green's numerous awards include NASA Exceptional Achievement Medal, Arthur S. Flemming award, and Japan's Kotani Prize in recognition of his international science data management activities.

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PMSE Advances in Human Space Exploration

Morning Session: Research

August 21, 2018 • 8:30– 10:05 am • Westin Boston Waterfront



8:30 am - Session Chair Introduction

Qinghuang Lin – Research senior manager at IBM Watson Research Center in NY. IBM Master Inventor with over 80 granted US patents and more than 70 US patents pending. Editor/co-editor of 6 books and author/co-author of 60 technical papers. Associate Editor of Journal of Micro/Nanolithography, MEMS, and MOEMS and served as a Guest Editor of Journal of Materials Research. Past Chair of ACS Polymeric Materials Science & Engineering (PMSE).



8:35 am - Needs and Opportunities in the Development of Advanced Materials and Manufacturing Methods for Future Long-Duration Human Space Exploration

Michael Meador – NASA Glenn Research Center Program Element Manager, Lightweight Materials and Manufacturing, Game Changing Development Program. Former Director of the National Nanotechnology Coordination Office and was the Chief of the NASA Glenn Polymers Branch. ACS Fellow. NASA Exceptional Service Medal for nanotechnology R&D.



9:05 am - Optimization of organic solar cells through experimental design and machine learning

Jillian M. Buriak – Chemistry Professor, Canada Research Chair of Nanomaterials, and Senior Research Officer of the National Institute for Nanotechnology at the University of Alberta. Editor-in-Chief ACS Chemistry of Materials. Nanoparticle synthesis for applications in energy, block copolymer self-assembly on surfaces. Fellow, Royal Society of Canada, Rutherford Medal, ACS Pure Chemistry Award.



9:35 am - Wearable Electrochemical Sensors

Joseph Wang – SAIC Endowed Chair, Distinguished Professor, Chair of Nanengineering, UCSD. Director, Center Wearable Sensors (UCSD), C-Director, Center for Mobile-health Systems (UCSD), 'Citation Laureate' Award-ISI Institute- World Most Cited Scientist in Engineering during the 1991-2001 and 1995-2005 periods. Chief-Editor - Electroanalysis (international journal; Wiley-VCH Publishers); 1988-present. Associate Editor- Wiley Encyclopedia of Analytical Chemistry; 2007-present.

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Morning Session: Research

August 21, 2018 • 10:20– 11:50 am • Westin Boston Waterfront



10:20 am – Oral paper

Paul Weiss– UCLA Professor, Director at California NanoSystems Institute. Chemistry, MIT BS and MS. UC Berkeley PhD. Post Doc at Bell Labs. Began career at Penn State in 1989. His research group includes chemists, physicists, biologists, materials scientists, electrical and mechanical engineers, and computer scientists. They advance nanofabrication to small scales and greater chemical specificity in order to connect, to operate, and to test molecular devices. Over 200 papers and patents.



10:50 am - Harnessing the Chemistry and Physics of Silicon Nanomaterials for Micro and Nano-Scale Sensing Devices. **Michael Sailor**– Distinguished Professor of Chemistry and Biochemistry at UCSD. Chemistry MS PhD Northwestern U. Duward Shriver. Post Doc at Stanford and Caltech. Holds 37 patents that have been licensed to 7 companies. Founder of Spinnaker Biosciences and Common Sensor Technologies. Has published 226 peer-reviewed papers, 1 book. Editorial boards of Nanoscale Horizons, ACS Sensors, ACS Nano, Molecular Cancer Therapeutics...



11:20 am - Polymers and manufacturing: a space flow chemistry perspective.

Rigoberto Advincula – Macromolecular Science and Engineering Professor Case Western Reserve U. Post-Doc Stanford. Chemistry PhD U. Florida, Gainesville, BS U. Philippines. Visiting Researcher HP and IBM Almaden. His group investigates supramolecular synthesis and structure of polymers and nanomaterials capable of controlled-assembly to form ultrathin films and dispersions, to provide amphiphilicity, ligand functionality, electrochemical activity, and in the preparation of pi-electron conjugated oligomers and polymers.

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PMSE Advances in Human Space Exploration

Afternoon Session: Research & Industry



August 21, 2018 • 8:30– 1:00 – 2:10 pm • Westin Boston Waterfront



1:00 pm – Opening Remarks

Peter Dorhout – Kansas State University, Vice President for Research. He worked at Colorado State University-Pueblo, DuPont and Los Alamos. Fellow at ACS and Alfred P. Sloan. ACS member since 1985. Member of Divisions: I&EC, INOR and NUCL. Holds a PhD in Chemistry.



1:05 pm - Industry Session Organizer Remarks

Charles Brumlik – CME Vice Chair, Managing Director at Nano-Biz LLC in Branchburg, NJ. Advises multinational corporations, investors, startups, and governments on technology assessment and commercialization. Has 20+ nanotechnology publications and patents on materials. Holds a PhD in Chemistry and a JD.



1:10 pm - Robust and thick polymer brushes grafted from gold surfaces using bidentate thiol-based initiators

T. Randall Lee – U. of Houston Distinguished University Chair and NSM Associate Dean for Research. NIH Postdoctoral Fellow, Caltech. PhD Harvard, BA Rice. Research in fluorinated organic thin films using SAMs, complex organic interfaces, biologically active interfaces, nanoparticle, biopolymers and catalysts. Uses in miniaturized electronic device applications and as coatings for biomaterials, sensors, artificial enzymes, tissue engineering.



1:40 pm - Advanced nanomaterials for aerospace and related applications. Younan Xia – Brock Family Chair and Eminent Scholar in Nanomedicine, Biomedical Engineering at Georgia Institute of Technology. PhD in physical chemistry from Harvard (with G. Whitesides), MS inorganic chemistry UPenn, BS chemical physics University of Science and Technology of China (USTC). Focus on synthesis of novel nanomaterials for use in nanomedicine, regenerative medicine, cancer therapeutics, tissue engineering, controlled release, catalysis, and fuel cell technology

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Afternoon Session: Research & Industry

August 21, 2018 • 8:30– 2:25 – 3:40 pm • Westin Boston Waterfront



2:25 pm – Industry Panel Moderator Remarks

Bibiana Campos-Seijo – Editor-in-Chief and VP of C&EN Media Group at ACS Publications. Previously worked as Magazines Publisher and Editor at Royal Society of Chemistry, Author - What's Inside? Column at Wired Magazine and Editor in Chief of Advanstar Communications. BS and PhD in Chemistry.



NASA JPL overview and the quest for more capability in smaller systems. **David Bearden** – NASA JPL Senior Capture Lead & Strategist, Office of Formulation. USC MS PhD Aerospace Engineering. He has supported many NASA interplanetary and Earth-science programs. In 2006, he shared The Aerospace Corp. President's Achievement Award for leading the Hubble Space Telescope Servicing Analysis of Alternatives. Recipient of the Aviation Week & Space Technology Annual Aerospace Laurels in 2000.



Joseph Cassidy - Executive Director, Space Programs, Washington DC Operations, Aerojet Rocketdyne. Helps oversee strategy and architectures for future space and launch systems. BS MS Aeronautics-Astronautics Purdue, Systems Engineering GWU. 3 decades in propulsion and mission and systems analysis, 50 technical papers dealing with electric propulsion, power and attitude control systems and mission analysis. Flight projects for Air Force and NASA. Led teams for highest power electric propulsion system flown and the EO-1 Pulsed Plasma Thruster system. VP Electric Rocket Propulsion Society and Director for ExploreMars.

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Industry Session Remarks – 2018 ACS President

Peter Dorhout – Kansas State University, Vice President for Research. He worked at Colorado State University-Pueblo, DuPont and Los Alamos. Fellow at ACS and Alfred P. Sloan. ACS member since 1985. Member of Divisions: I&EC, INOR and NUCL. Holds a PhD in Chemistry.



Lectures Introduction – ACS CEO

Thomas M. Connelly, Jr. – Executive Director and CEO of the American Chemical Society since February 2015. Former DuPont Executive VP, Chief Innovation Officer. Joined DuPont in 1977 and played key roles in Delrin®, Kevlar®, Sorona® and Teflon®. B.S. and Ph.D. in Chemical Engineering.



Symposium Co-Sponsor – 2017 ACS President

Allison Campbell - American chemist who is known in the areas of biomineralization, biomimetics and biomaterials for her innovative work on bioactive coatings for medical implants. She was director for the Earth and Biological Sciences Directorate at the Pacific Northwest National Laboratory (PNNL) of the Department of Energy.



Symposium Co-Sponsor – 2019 ACS President

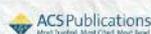
Bonnie Charpentier - Senior Vice President of Regulatory, Quality and Drug Safety at Cytokinetics, Inc. She earned her bachelor's degree in anthropology and her Ph.D. in biology (plant physiology) from the University of Houston. Her first job in industry was as an analytical chemist, followed by a career in drug development. She has been an active member of ACS since 1982..

ACS President Recommends this 2nd ACS NASA Symposium



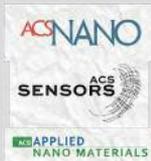
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"We choose to go to the Moon in this decade and do the other things, not because they are easy, but because they are hard; because that goal will serve to organize and measure the best of our energies and skills, because that challenge is one that we are willing to accept, one we are unwilling to postpone, and one we intend to win."

John F. Kennedy
May 25, 1961.



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PMSE Advances in Human Space Exploration Symposium Organizers

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Technical Session Chair

Qinghuang Lin – Research senior manager at IBM Watson Research Center in NY. IBM Master Inventor with over 80 granted US patents and more than 70 US patents pending. Editor/co-editor of 6 books and author/co-author of 60 technical papers. Associate Editor of Journal of Micro/Nanolithography, MEMS, and MOEMS and served as a Guest Editor of Journal of Materials Research. Past Chair of ACS PMSE division.



Lectures & Awards Organizer

George Rodriguez – CME Past Chair. Management advisor on business strategy and technology partnering. Served at Asahi Glass, Nagase, Pfizer, U. Carbide. Has led original programs, such as the Leadership Awards, that positioned CME as a premier ACS topical group. First in class in both B.S. Chemical Engineering, M.S. Industrial Management.



Industry Session Organizer

Charles Brumlik – CME Vice Chair. Managing Director at Nano-Biz LLC in Branchburg, NJ. Advises multinational corporations, investors, startups, and governments on technology assessment and commercialization. Has 20+ nanotechnology publications and patents on materials. Holds a PhD in Chemistry and a JD.

1-min ACS Video: [Before we go to Mars](#)

5-min C&EN Video: [Chemistry and Mars Exploration](#)

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6. Chemical Health & Safety (CHAS)
7. Chemical Information (CINF)
8. Colloid & Surface Chemistry (COLL)
9. Computers in Chemistry (COMP)
10. Environmental Chemistry (ENVR)
11. Fluorine Chemistry (FLUO)
12. Geochemistry (GEOC)
13. Inorganic Chemistry (INOR)
14. Nuclear Chemistry & Technology (NUCL)
15. Physical Chemistry (PHYS)
16. Polymer Chemistry (POLY)
17. Polymeric Materials: Science & Engineering (PMSE)
18. Small Chemical Businesses (SCHB)

About ACS

A nonprofit organization established in 1876 and chartered by the U. S. Congress, the American Chemical Society (ACS) is the world's largest scientific society with 150,000 members. The ACS has the CAS registry of over 140 million substances and publishes over 50 scientific journals and the weekly magazine C&EN. Featured Journals at this event: ACS Applied Nano Materials, ACS Sensors and ACS Nano.

About PMSE

The Polymeric Materials: Science and Engineering Division (PMSE) was founded in 1924 as the Paint and Varnish Division, and until 1983 was known as the Division of Organic Coatings and Plastics Chemistry. Areas of interest include coatings, plastics, adhesives, biomedical polymers, composites, electronic applications.

About CME

Established in 1954, and winner of four ChemLuminary awards since 2012 the Chemical Marketing and Economics (CME) topical group of the American Chemical Society's New York Section, organizes trailblazing programming including the ACS NASA Human Space Exploration Symposia, the Leadership Awards, monthly webcasts, over 500 monthly NYC luncheons where business, investment and technology leaders share their insights on energy, materials and life science.

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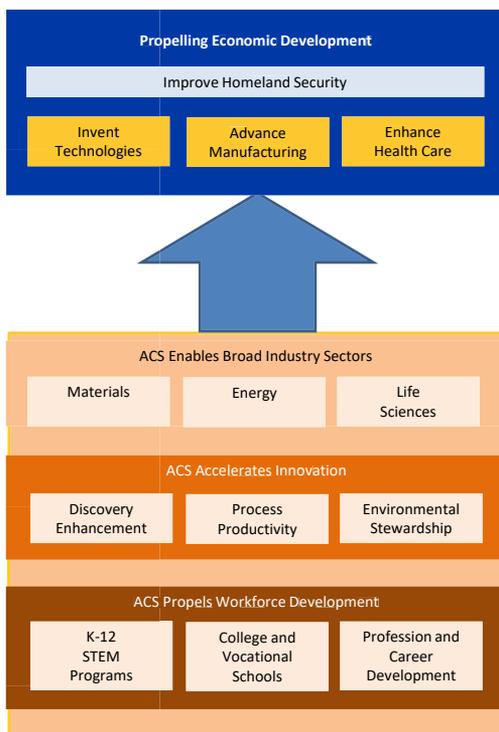
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New York Meetings

www.newyorkacs.org

ACS, NEW YORK SECTION BOARD OF DIRECTORS

MEETING DATES FOR 2018

The dates for the Board of Directors Meetings of the ACS New York Section for 2018 have been selected and approved. The meetings are open to all – everybody is welcome. All non-board members who would like to attend any of the meetings ought to inform the New York Section office by emailing Mrs. Marilyn Jespersen at njesper1@optonline.net or by calling the Section office at (516) 883-7510.

The remaining two board meetings will be held at St. John's University, 8000 Utopia Parkway, Queens, NY. The meeting room will be posted on the New York Section website at www.NewYorkACS.org. Dr. Joseph Serafin will chair all meetings. Refreshments will be available starting at 6:00 PM and the board meeting will start at exactly 6:30 PM.

The Board Meetings dates for 2018 are:

Friday, September 14, 2018

Friday, November 16, 2018

More information will be posted in future monthly issues of *The Indicator* and on the New York website at <http://www.NewYorkACS.org>



NEW YORK SECTION – SOCIETY FOR APPLIED SPECTROSCOPY

New York SAS Section
Announces the
Forthcoming Meetings



The New York/New Jersey section of the Society for Applied Spectroscopy is pleased to announce the new meeting schedule coinciding with the next academic year, beginning in September 2018. The following speakers will be presenting their work, as well as others for future meetings:

September 13, 2018 – John Wasylyk, title: “Development of ‘Fit-for-Purpose’ Near Infrared Spectroscopic Methods for Lyophilized Biopharmaceuticals,” to be held at Horiba Scientific, 20 Knightsbridge Road, Piscataway, NJ 08854,

October, 2018 – Christine Sayhoun, title: “A comparison of structural and functional optical coherence tomography systems for assessment of hard dental tissues”

November, 2018 – EAS Gold Medal Award Program honoring Professor Igor Lednev, University of Albany sponsored by NY/NJ SAS and EAS. – held in conjunction with the Eastern Analytical Symposium (EAS), November 11-14, 2018

December 5, 2018 – Curtis Marcott, Ph.D - Special Tour Speaker Meeting. Title: “Perspectives on the Future of IR Spectroscopy: IR beyond the diffraction limit at submicron and nanoscale spatial resolutions via photo-thermal techniques”

Due to the required lead times for publication, we have to make this announcement before we have all the details of the meetings arranged. Everyone interested in attending a meeting will find the meeting details posted on the NYSAS website: www.nysas.org as soon as they become available. Please consult the website regularly for updates about the meeting details, as well as possible changes and information about future meetings. If you plan to attend a meeting, please email the NY/NJ SAS secretary at debperu@outlook.com beforehand so we can make arrangements for the expected number of people. Your name will also then be added to our e-mail list for future meeting announcements unless you request to not be added.



BIOCHEMICAL TOPICAL GROUP – JOINT MEETING WITH NYAS BIOCHEMICAL PHARMA- COLOGY DISCUSSION GROUP

Neuro-Immunology: The Impact of Immune Function on Alzheimer's Disease

Organizers: Christopher R. Butler, PhD
Pfizer

Philip de Jager, MD, PhD
Columbia University
Irving Medical Center

Fabrizio Gasparini, PhD
Novartis Institutes for
Biomedical Research

(continued on page 20)

BIOCHEMICAL TOPICAL GROUP

(continued from page 19)

Samuel Hasson, PhD
Amgen

Heather M. Snyder, PhD
Alzheimer's Association

Claire Steppan, PhD
Pfizer

Sara Donnelly, PhD
NY Academy of Sciences

Sonya Dougal, PhD
NY Academy of Sciences

Speakers:

Elizabeth Bradshaw, PhD
Columbia University
Irving Medical Center

Philip de Jager, MD, PhD
Columbia University
Irving Medical Center

Frederic Geissmann, MD, PhD
Memorial Sloan Kettering
Cancer Center

Catherine Kaczorowski, PhD
The Jackson Laboratory

Bruce Lamb, PhD
Indiana University School of
Medicine

Marta Olah, PhD
Columbia University
Irving Medical Center

Anne Schaefer, MD, PhD
Icahn School of Medicine at
Mount Sinai

Jia Shen, PhD
Harvard Medical School

Malu Tansey, MD, PhD
Emory University School of
Medicine

Linda Van Eldik, PhD
University of Kentucky

This one-day symposium will present recent developments in our understanding of how innate immune processes impact the pathobiology of Alzheimer's Disease (AD). Moreover, the program will explore emerging dynamic mechanisms at the intersection of neurology and immunology with the goal of targeting the innate immune system in the CNS for next-generation AD therapeutics.

Date: Tuesday, September 25, 2018

Time: 9:00 AM – 5:00 PM
(reception to follow)

Place: The New York Academy of Sciences
7 World Trade Center
250 Greenwich Street – 40th Floor
New York, NY 10007

Cost: This event is has reduced-rate registration for ACS and NYAS members, at \$60, or \$25 (for students and post-docs).

Please select the appropriate non-member Registration Category and use the Priority Code ACS. Non-members may attend for a fee of \$160 (corporate), \$105 (non-profit or academic) or \$70 (students and post-docs).

For more information and to register for the event, go to www.nyas.org/neuroimmunology2018

To become a Member of the Academy, visit www.nyas.org/benefits



EMPLOYMENT AND PROFESSIONAL RELATIONS COMMITTEE OF THE NEW YORK SECTION

To Human Resources Departments in Industry and Academia

The Employment and Professional Relations Committee maintains a roster of candidates who are ACS members seeking a position in the New York metropolitan area. If you have job openings and would like qualified candidates to contact you, please send a brief job description and educational/experience background required to hessytaft@hotmail.com.

Candidates from our roster who meet the requirements you describe will be asked to contact you.



WESTCHESTER CHEMICAL SOCIETY

FUTURE MEETINGS

Special Seminar – “Living in the Polymer World: Polymers and Macromolecules in Our Daily Lives”

Speaker: Joseph W. Krumpfer, Ph.D.
Assistant Professor of Polymer and Inorganic Chemistry
Department of Chemistry & Physical Sciences

Dyson College of Arts and Sciences
Pace University
861 Bedford Road
Pleasantville, NY 10570



Abstract: Polymers are the single most important material currently used by humanity. They comprise everything from construction materials to cosmetics and can be found

in nearly every aspect of daily life. This talk will offer a brief introduction into what polymers are and how they are made, both synthetically and industrially. Applications of these polymers and their unique properties are also discussed. Furthermore, a historical overview on the increasing importance of polymers to human development is presented. Finally, the effect of the environmental impact of polymers, both positive and negative, along with recent advances in mediating polymer waste problems and renewable energy devices, gives a brief outlook into how these materials can solve many of the most pressing problems facing our society.

Biography: Dr. Joseph W. Krumpfer received his B.S. in Chemistry at Seton Hall University in South Orange, NJ and his M.S. and Ph.D. in Polymer Science and Engineering at the University of Massachusetts - Amherst. His post-doctoral research in the field of carbon fiber precursor polymers was performed at the Max Planck Institute for Polymer Research in Mainz, Germany where he was awarded an Alexander von Humboldt Post-Doctoral Researcher Fellowship. Currently, he is an assistant professor of Inorganic and Polymer Chemistry at Pace University in Pleasantville, NY. His current research interests include conductive and light-emitting polyquinolines, silicone-inorganic oxide equilibration reactions, and pre-ceramic polymers and materials for high temperature applications.

Date: Tuesday, October 2, 2018

Times: Refreshments - 5:30 PM
Lecture - 6:00 PM

Place: Westchester Community College
Gateway Building Room 110
75 Grasslands Road
Valhalla, NY 10595

Cost: Free and Opened to the Public

For further information: contact Paul Dillon

E-Mail: PaulWDillon2@hotmail.com

Phone 1-914-393-6940

Special Seminar – “Tripodal Ligands in Bioinorganic and Organometallic Chemistry: Carbon Dioxide Functionalization and Mercury Detoxification”

Speaker: Gerard Parkin, D.Phil.
Professor, Department of Chemistry
Columbia University
New York, NY

Tentative

Date: Tuesday, November 6, 2018

Times, Place, Additional Information, see under October meeting.

Special Seminar – “Mitochondrial Reactive Oxygen Species (ROS) as a Non-Toxic Adjuvant Integrative Anticancer Therapy Option for Adult Stage IV Solid Tumor Patients (Brain, Lung, Breast, and Prostate) When Traditional Therapy Options Have Been Exhausted: Palladium/Lipoic Acid Complex and Coenzyme Q10 Impacting the ROS Production and Apoptosis

Speaker: Edward J. Neren
Biomedical/Pharmaceutical
Consultant/Contractor
Neren & Co. / NerenPossible
Services
3 Belvedere Path
Suffern, NY 10901

Date: Thursday, December 6, 2018

Times, Place, Additional Information, see under October meeting.

TEACHING STUDENTS WITH DISABILITIES

A 2017 NSF report (Women, Minorities and Persons with Disabilities in Science and Engineering) reports that 6% of the US population ages 18-34 is estimated to have a disability, and that in 2012 about 11% of the undergraduate population reported a disability. Nearly 25% of these students enroll in a science or engineering field. Do you feel knowledgeable about including students with physical disabilities requiring mobility, visual or hearing accommodations in the laboratory setting?

The New York Section has received an Innovative Projects Grant (IPG) to hold a day-long symposium on methods for adapting laboratory experiences for students with disabilities. Our target audience includes high school and college science faculty, graduate teaching assistants, and disability service administrators. The program is being co-sponsored by the national ACS Committee on Chemists with Disabilities and the CUNY Graduate Center, and will be free to attendees.

The program will be held on **Saturday, October 27** in Manhattan, at the CUNY Graduate Center, Fifth Avenue and 34th Street, tentatively from 9:30 AM to 3:00 PM. In addition to the live audience, we plan to videotape the symposium and livestream it on Facebook Live.

Potential topics will include, but not necessarily be limited to:

- safety considerations in the lab environment
- adapted lab equipment and procedures
- electronic data collection in the laboratory



- adaptations for written handouts, computer resources, and evaluative materials
- ACS materials and programs
- service dogs in the laboratory environment

Registration information will be available in September, but if you have questions or want to ensure you are on the mailing list, please contact the symposium organizer, Dr. Patricia Redden, at predden@saintpeters.edu. If you have expertise in any of the topics, please contact Dr. Redden to be included in the program.

Date: Saturday, October 27, 2018

Times: 9:30 AM - 3:00 PM

**Place: CUNY Graduate Center
Fifth Avenue and 34th Street
New York, NY**



NY SECTION 2018 ELECTIONS RESULTS

The results of the ACS New York Section's 2018 elections, held in May, were announced at the Board of Directors meeting on June 8, 2018. The New York Section extends a sincere thank you to all of the candidates and expresses its appreciation for their time and efforts in preparing for the elections. Congratulations to all!

Chair-elect for 2019

Ruben Savizky
(Cooper Union)

Secretary for 2019 – 2020

Daniel Amarante
(College of Mount Saint Vincent)

Directors-at-Large for 2019

Yosra Badiei
(St. Peter's University)
Daniel Silverio
(Adelphi University)
Joseph Wiener
(PepsiCo)

Councilors for 2019-2021

Brian Gibney
(Brooklyn College & the CUNY Graduate Center)
Pamela Kerrigan
(College of Mount Saint Vincent)
JaimeLee Rizzo
(Pace University)

Alternate Councilors for 2019-2021

Justyna Widera-Kalinowska
(Adelphi University)
Hiroko Karan
(Medgar Evers College)
Ronald D'Amelia
(Hofstra University)

WILLIAM H. NICHOLS MEDAL AWARD FOR 2018 AND SYMPOSIUM

The William H. Nichols Medal Award for 2018 was presented to Dr. Debra R. Rolison of U.S. Naval Research Laboratory on April 13th, at an award dinner at the Crowne Plaza Hotel, White Plains, NY. Dr. Rolison received the Nichols gold Medal "For Pioneering Energy Relevant 3D Nanoarchitectures." Over two hundred industrial chemists, students and faculty from New York Local Section colleges and universities were in attendance at the gala event.

The William H. Nichols Distinguished Symposium, that preceded the award dinner, was titled "The Future of Energy Science ... Without Chemists? Unachievable." The 208 attendees enjoyed research talks by these internationally known speakers: Dr. Stephanie L. Brock (Wayne State University); Dr. Jillian L. Dempsey (University of North Carolina-Chapel Hill), Dr. Héctor Abruña (Cornell University), and Dr. Rolison who gave the Award Lecture titled "Architectural Design, 1D Walls, 3D Plumbing, and Painting Blind en Route to Multifunctional Nanoarchitectures for Energy Storage." Dr. Justyna Widera-Kalinowska, Chair-elect of the New York Section, expertly emceed the symposium, introducing each speaker. The Nichols Distinguished Symposium and the following social hour were enjoyed by all.

Dr. Joseph M. Serafin, 2018 Chair of the ACS New York Section, welcomed the award dinner guests and recounted the story of William H. Nichols and the history of the Nichols Medal. American Chemical Society President Dr. Peter K. Dorhout and Dr. Laura Pence (District I Director of ACS) brought greetings and congratulations from the 153,000 members of the ACS. Dr. Henry S. White delighted the room with a touching and spirited introduction of Dr. Debra R. Rolison. It is worth to notice that Dr. Rolison is a third woman that received the Nichols medal in the Nichols Award history. Chair Serafin then awarded the gold medal, identical bronze medal and an honorarium to Dr. Rolison. The Medalist and speakers then happily met with students and posed for photos with them.

Members of the Nichols family also enjoyed this special event. The New York Section was honored to have as guests: Mr. C. Walter Nichols III (great grandson of William H. Nichols), his wife Helga Nichols, and Mrs. Sandra Nash (great, great granddaughter). It is exciting and truly a great pleasure to have the Nichols family members present at the presentation of the Nichols Medal as continuation of the Dr. William H. Nichols legacy.

The Nichols Medal Award was established in 1902 by Dr. William H. Nichols to honor a chemical scientist for outstanding original research and was first awarded in 1903. Dr. Nichols, a charter member of the American Chemical Society and its president in 1918 and 1919, maintained a deep commitment to research and development and to the importance of supporting science education and students of chemistry. Since its inception, through an endowment fund, the New York Section administers the award. It has been perpetuated by the generosity of Dr. Nichols, his family and the Nichols Foundation, Inc. The William H. Nichols Medal is the first award in chemistry of the American Chemical Society.

(All photos courtesy of Brian Gibney)



**NY ACS
Chair Dr.
Joseph
Serafin wel-
comes
attendees to
the Distin-
guished
Symposium.**



**NY ACS
Chair-elect
Dr. Justyna
Widera-
Kalinowska
hosting the
Distin-
guished
Symposium.**



Dr. Debra Rolison presenting the Medalist's seminar.



Dr. Debra Rolison accepting the Nichols Medal from Dr. Joseph Serafin.



Over 200 Symposium attendees listening to an excellent talk by Dr. Abruña.



Symposium Speakers posing for a group photo following the symposium - NY ACS Chair Dr. Serafin, Medalist Dr. Debra Rolison, Dr. Hénry Abruña, Dr. Stephanie Brock, Dr. Jillian Dempsey and NY ACS Chair-elect Dr. Widera-Kalinowska.



After the dinner, Medalist Rolison met with college students.



Nichols family with NY ACS Chair Serafin. – Mrs. Helga Nichols, Mr. C. Walter Nichols III and Sandy Nash Nichols.



Members of the Nichols family truly enjoy the festivities. Sandy Nichols Nash and C. Walter Nichols III standing on either side of the Medalist.

Dr. Rolison with ACS President Dr. Peter Dorhout and ACS District One Director Dr. Laura Pence, both of whom brought greetings from National ACS.



200 Dinner guests, including many undergraduate students, listening to an enjoyable introduction of Medalist Dr. Rolison by her colleague and friend, Dr. Henry White.



Mr. C. Walter Nichols III enjoying a conversation with the ACS President. Drs. Anne O'Brien, Padmanabhan and Serafin look on.

Sandy Nichols Nash, Dr. Neil Jespersen, Mrs. Marilyn Jespersen and Dr. Peter Dorhout.



QCC faculty and students with ACS President Dr. Peter Dorhout.

Medalist Dr. Debra Rolison with ACS Officers and Nichols Speakers.





NY ACS Chair Serafin welcoming Nichols Research Fellow Salah Eldein Elkattawy and his mentor Dr. Joel Belasco of NYU to the Nichols Symposium



Former Chairs of the New York Section, standing: Dr. Philip Mark, Dr. Hiroko Karan Mr. Frank Romano, Dr. Alison Hyslop; seated: Dr. Donald Clarke, Dr. Barbara Hillary



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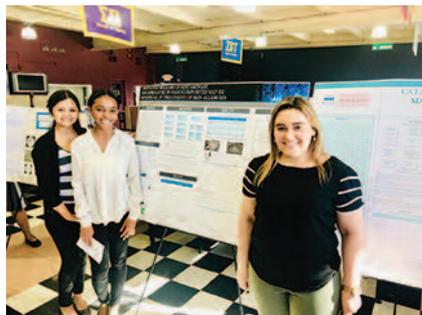
20th ANNUAL STUDENT RESEARCH SYMPOSIUM AND STUDENT AWARD NIGHT

We had a total of 15 presenters from four different universities participate that day. Along with that, the chair of the New York Chapter of the ACS, Joseph Serafin, was gracious enough to join us for the presentations and for the talk by Tanji T. Talele from St. John's University.

(All photos courtesy of Thomas Drwiega)



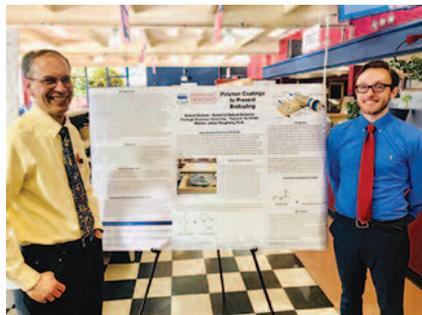
Dr. Tanji T. Talele speaks to the students about his research at St John's University on "Design and Synthesis of Poly(ADP-Ribose) Polymerase Inhibitors."



Jessica Maldonado, Faith Adams, and Karina Magro-Machado present their findings on "Sustained Release of Histaminase Encapsulated in Nanocomposites May Be Beneficial in Treatment of Skin Allergies" mentored by Dr. Mihaela Leonida.



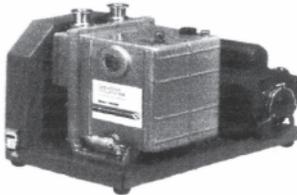
ACS New York Chair, Joseph Serafin, speaks to one of the student presenters, John Carlet, mentored by Dr. Andre Wallace.



Samuel Durham and his mentor, Dr. James Dougherty (Director of the School of Natural Sciences, FDU-Metro).



All Presenters, mentors, and guests
(Bottom) Dr. Tanji T. Tanlele, Dr. Ish Kumar, Dr. Mihaela Leonida, Dr. Ken Yamaguchi, Kristina Neri, Alexandra Geczo.
(Middle) Louis Durosier, Carolina Durand, Bernieve Dabady, Faith Adams, Karina Magro-Machado, Syeda Fatima Ali, Jessica Maldonado, Thu Le.
(Back) Dr. James Dougherty, Samuel Durham, Joseph Serafin, John Carlet, Sneha Patel, Dinesh Amraram Choudhary, Angelica Guzman, Dr. Stephen Anderson, Dr. Andre Wallace.



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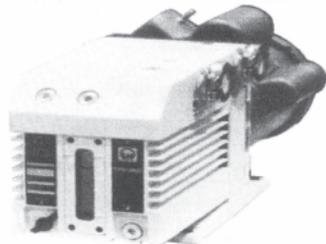
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National

2018 CLASS OF ACS FELLOWS

The American Chemical Society (ACS) Fellows Program was created by the ACS Board of Directors in December 2008 to recognize members of ACS for outstanding achievements in and contributions to science, the profession, and the Society.

2018 ACS FELLOWS

The ACS is proud to announce its 2018 ACS Fellows. Congratulations to its 51 members for their outstanding achievements in and contributions to science, the profession, and the Society. The 2018 ACS Fellows were announced in the July 16 issue of *C&EN* and will be honored at the fall ACS National Meeting in Boston.

From the New York Section



Brian R. Gibney
Brooklyn College and the Graduate
Center of the
City University of
New York

Contribution to the science/profession: Recognized for his pioneering work in using designed heme, iron-sulfur and zinc metallo-proteins to delineate fundamental principles of metalloprotein structure/function relationships, including their biosynthesis, electro-chemistry, and role in protein folding.

Contribution to the ACS community: Served the New York Section membership as Secretary, Councilor, and Chair. Founded the Nichols Fellows program and the Brooklyn Frontiers in Science Public Lecture to communicate chemistry's value.



Barbara Hillery
SUNY Old
Westbury

Contribution to the science/profession: Recognized for excellence in teaching, educational leadership, and significant contri-

butions to the measurement of ubiquitous anthropogenic environmental contaminants.

Contribution to the ACS community: Known for sustained and dedicated service to the NY Local Section and to the broader ACS community.



Paris D.N. Svoronos
Queensborough
Community
College - CUNY

Contribution to the science/profession: Recognized for spearheading community college undergraduate research through grants and instrument acquisition. His students present at annual National ACS Meetings and regularly receive Research Experiences for Undergraduates Awards from the NSF.

Contribution to the ACS community: Mid Atlantic Regional Meeting Co-Chair (2008) and Program Co-Chair (2016). Co-organized NY section community college undergraduate research symposia (2004 and 2008). Long Island subsection (2002) and NY Section (2015) chair.

From the North Jersey Section



Mrs. Bettyann Howson
Chatham High
School (retired);
Secretary, North
Jersey Section

Contribution to the science/profession: Recognized for innovative and effective teaching strategies, applications of science education technologies, leadership in professional development collaboration, and encouraging and mentoring students in the premier state and national science competitions.

Contribution to the ACS community: Recognized as chair of the Committee on Chemical Safety, and leadership in developing, promoting, and implementing chemical safety education guidelines and in advocating for improved safety culture throughout the chemistry profession.

North Jersey Meetings

<http://www.njacs.org>

NORTH JERSEY EXECUTIVE COMMITTEE MEETING AND SEED STUDENT SYMPOSIUM

Section officers, councilors, committee chairs, topical group chairs, and section event organizers meet regularly at the Executive Committee Meeting to discuss topics of importance to running the section and representing the membership. All ACS members are welcome to attend this meeting and to become more involved in section activities. In addition high school students who participated in this summer's SEED research program present their data to judges from Industry and Academia.

Date: Monday, September 17, 2018

Times: Project SEED Poster Session
4:00 - 6:00 PM

Place: Seton Hall University
Student Center, Room TBA

Times: Dinner follows Poster Session
Executive Meeting 7:30 - 9:00 PM

Place: Seton Hall University
Room TBA
400 South Orange Avenue
South Orange, NJ

Cost: Dinner cost of \$35 is payable at the door, no charge for judges of posters and 2018 ACS award winner.

For reservations please call NJACS secretary Bettyann Howson (973) 822-2575 or email chemphun@gmail.com or register online at <http://www.njacs.org> prior to **Wednesday, September 12, 2018.**



NMR TOPICAL GROUP

NMR Symposium

On Monday, September 24th at Princeton University in Frick Chemistry Laboratory, the NMR Topical Group will gather in the afternoon and evening hours for the annual NMR Symposium. The event will include a lineup of six afternoon speakers discussing the many applications of NMR Spectroscopy across basic and medical research. A shared evening Keynote session co-hosted by the NJACS and PACS will then follow, closing out the evening with a networking

hour and catered buffet dinner. Seminar attendance is free to all – cost for dinner will range from \$10 to \$20.

In addition to the NMR Symposium, this event is being expanded in 2018 to accommodate a Student Career Forum, running in parallel and attracting local graduate and undergraduate students. This session, co-hosted by NJACS and PACS, will offer an ACS Career Pathways Course, resume building session, and Chemistry Career Conversations (i.e. speed networking) with representatives from local companies. All attendees of the Student Career Forum will be welcomed to the NMR Symposium during the afternoon and shared evening Keynote speaker.

You surely won't want miss this event! Please see our website for full information on speaker lineup, seminar topics, and timings. We would also greatly appreciate your advance registration in order to plan appropriately for food and beverages.

Date: Monday, September 24, 2018

Times: 1:00 PM - 8:30 PM

Place: Princeton University
Frick Chemistry Laboratory

Cost: Seminar – free
Dinner – \$10-\$20

See flyer on page 32 for complete program



NORTH JERSEY CHROMATOGRAPHY GROUP

Symposium: The Modernization of Chromatography

Date: Wednesday, September 26, 2018

Times: 1:00 PM - 6:00 PM

Place: The Doubletree
Somerset, NJ

See Call for Abstracts, page 43.



CAREERS IN TRANSITION MEETINGS

There will be no Careers in Transition Meetings until further notice.



NORTH JERSEY CANDIDATES

(See article on page 43.)



North Jersey ACS NMR Topical Group

in collaboration with

Princeton ACS Section

present

2018 NMR Symposium

September 24th, 2018

Princeton University

More details and registration available: <http://www.njacs.org/nmr-spectroscopy-topical-group>

Afternoon session (1:00 – 5:40 pm)

Nate Traaseth
New York University

Clark Ridge
Food & Drug Administration

David Rovnyak
Bucknell University

Rafael Brüschweiler
Ohio State University

Andrew Lee
University of North Carolina

Paola Di Lello
Genentech

Evening Keynote session (6:00 – 7:15 pm)

Dorothee Kern
Brandeis University

Dinner (7:15 – 8:30 pm)

*(Taylor Commons aka Frick Laboratory Atrium,
\$20 employed; \$15 unemployed/retired; \$10 students
Register for dinner through website in advance)*

We acknowledge the generous support of our sponsors:



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Suraj Manrao Science Fund



CHEMEXPO

at Liberty Science Center

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NJACS needs your help to make ChemExpo a success. If you or your organization would like to sponsor the event or volunteer as a participant, please visit <https://tinyurl.com/NJACSncw>

Save the date
Saturday, 10/20/18
10 am - 2 pm

NORTH JERSEY SECTION ACS 2018 AWARDS AND RECOGNITION DINNER

More than 110 honorees and their guests attended the North Jersey Section of the American Chemical Society 2018 Awards and Recognition Dinner on May 21st. The festivities were held at the Mansion on the Florham Park campus of Fairleigh Dickinson University. Recognition was given to the 50, 60, and 70 year members and awards were presented to students and their teachers as well as dedicated volunteers.

(All photos courtesy of Tom Krone)



2018 North Jersey Section of the American Chemical Society Awards Dinner at the Mansion, Fairleigh Dickinson University.

The 50, 60 and 70 Year members were recognized at the dinner for their service and contributions to the Society.



Back row: Jui Chang Chuang (50 yr.), Allan Greenberg (50 yr.), Faizulla Kathawala (50 yr.), John Gillham (60 yr.), Bernard Foss (50 yr.), David Kristol (60 yr.), William Wright (50 yr.), Gary Sanderson (50 yr.), Harvey Kellman (50 yr.), Arthur Dawson (50 yr.), Herbert Waddell (60 yr.), Joseph Bozzelli (50 yr.), Patrick Tolve (60 yr.), Ronald Yarger (50 yr.). Front row: Miriam Gulotta (NJ-ACS Chair), Dorothy Heinze (representing George Heinze, 60 yr.), Ramesh Pandey (50 yr.).



Bierce Riley (50 yr.) received her certificate from Miriam Gulotta, NJ-ACS Chair



David Zudkevitch (60 yr.) and Miriam Gulotta, NJ-ACS Chair

Alan Cooper, past chair of the section and current councilor received the Burton C. Belden Distinguished Service Award for “conspicuous service to the section.” Not only does Alan continue to serve on various committees at the local level, he represents NJ-ACS as chair of the ACS District III Councilor Caucus and as a member of the Committee on Committees.



Miriam Gulotta, 2018 Chair of NJ-ACS presents the Burton C. Belden Award to Alan Cooper, NJ-ACS Councilor



Linda and Alan Cooper

In recognition for their service to the section, NJ-ACS presented Pro-Bono Awards to Kathleen Anderson, Camilla Coniglio and Dmitri Lavlinski.



Bettyann Howson (right), NJ-ACS Councilor, presents Kathleen Anderson with the Pro Bono Award for her leadership in the Mass Spectrometry Discussion Group.



Bettyann Howson (right), NJ-ACS Councilor, presents Camilla Coniglio with the Pro Bono Award for her dedicated service and contributions to the Chemistry Olympiad Program.



Susan Fahrenholtz (left), Chair of the NJ-ACS Project SEED Program, presents the Pro Bono Award to Dmitri Lavlinski for his support of Project SEED students.

Each year, NJ-ACS honors those who have promoted chemistry in everyday life with Salutes to Excellence. This year's recipients are Mirlinda Biba, NJ-ACS ChemTAG, Drew University Chemistry Club, and New Jersey Science Teachers Association. Along with her leadership in the NJ Chromatography Group Mirlinda has been an enthusiastic promoter of chemistry at various outreach programs. NJ-ACS ChemTAG provides the chemistry teachers of New Jersey with outstanding professional development. The Drew University Chemistry Club developed a program where they mentor middle school students and give them the opportunity to be research chemists. The NJ Science Teachers Association promotes excellence in science teaching.



Mirlinda Biba receives a Salute to Excellence Award from Bettyann Howson, NJ-ACS Councilor



Abbie Young, Chair of NJ ChemTAG accepts a Salute to Excellence Award from Bettyann Howson



Sandra Keyser (left), Faculty Advisor for the Drew University Chemistry Club (DUCC), and Saif Yasim, President of DUCC, accept a Salute to Excellence Award from Diane Krone, NJ-ACS Councilor



Linda Burroughs (left) and Linda Smith (right), Vice-president and President of the New Jersey Science Teachers Association, accept a Salute to Excellence Award from Diane Krone, NJ-ACS Councilor



Professor Kimberly Grant Laham of the College of St. Elizabeth receives the Sr. Marian José Smith Excellence in Education Award for inspiring her students and encouraging Careers in Chemistry. Bettyann Howson, Chair of the Education Committee, presents the award.

FREDDIE AND ADA BROWN AWARDEES

At the 2018 Awards and Recognition Dinner, sixteen students from local Middle and High Schools were presented Freddie and Ada Brown Awards for their scholarship and interest in science. The award honors Freddie and Ada Brown who inspired and encouraged their daughter, Jeannette Brown, NJ-ACS Councilor, to pursue a career in chemistry.

The scholars are:

Dylan Poku
 Brian Ibeabuchi
 Eniola Aramide
 Kennedy Taylor
 Samantha Toronto
 Babatunde Amosu
 Vivek Mehta
 Richard Joseph
 Justin Wright
 Johnelle Steele
 Kimberly Glenn
 Schneider Germain
 Kaneshia Freeman
 Kayla Howell
 Arielle Nettingham
 Jordyn Nettingham

South Brunswick High School
 Bergen Academies
 Hillsborough High School
 Hillsborough High School
 Fair Lawn High School
 Fair Lawn High School
 Fair Lawn High School
 East Orange Campus High School
 Hillsborough Middle School
 Hillsborough Middle School



From left to right (back row): Vivek Mehta, Justin Wright, Samantha Toronto, Kennedy Taylor, Keneshia Freeman, Eniola Aramide, Richard Joseph, Kimberly Glenn, Brian Ibeabuchi, Schneider Germain, Dylan Poku. Front row: Kayla Howell, Jeannette Brown, NJ-ACS Councilor, Arielle Nottingham, Jordyn Nottingham

Also recognized at the Awards dinner were the North Jersey Section Chemistry Olympiad scholars and their teachers. The U.S. National Chemistry Olympiad, sponsored by the American Chemical Society, is a multi-tiered competition designed to stimulate and promote achievement in high school chemistry. The Scholars and their teachers are:

Scholar

Matthew Shinkar*
Lucy Zou
Shruti Venkata
James Pitingolo
Sean Yu*
Helen Liu
Ethan Liu
Savan Patel
Joseph Kim*
David Sheng*
Joyce An*
Jerry Yang*
Andrew Leung
Aaron Hao
Neelay Trivedi
Ranjan Mahanth*
Ian Gurland*

High School

Bergen County Academies
East Brunswick
Edison High School
Governor Livingston
JP Stevens HS
Millburn
Montgomery
Montgomery
Northern Valley Regional at Demarest
Northern Valley Regional at Demarest
Ridge
Ridge
South Brunswick
Watchung Hills Regional
Watchung Hills Regional
West Windsor-Plainsboro North
Westfield

Teacher

Rocco Galante
Daniel Pike
Shari Degenshein
Meredith Morgan
Michele Lumsden
John Yi
Jason Sullivan
Jason Sullivan
Nicholas Murphy
Nicholas Murphy
Margaret Mitchell
Margaret Mitchell
Roberto DeBari
Michael Gangluff
Michael Gangluff
Andrea Knorr
Lou Casagrande

* Denotes Honor Student



Nick Murphy, David Sheng, Joseph Kim, James Pitingolo, Shruti Venkata, Joyce An, Margaret Mitchell Aaron Hao, Andrew Leung, Meredith Morgan, (in rear) Mike Poot.



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NEW JERSEY HIGH SCHOOL STUDENTS COMPETE IN THE 33RD ANNUAL CHEMISTRY OLYMPICS AT NJIT



Tuesday May 22nd 2018 the 33rd New Jersey Chemistry Olympics was held at the New Jersey Institute of Technology (NJIT) in Newark, New Jersey. The event is a collaboration between the Department of Chemistry and Environmental Science in the College of Liberal Arts and Science at NJIT and the North Jersey Section of the American Chemical Society (NJACS). This year Merck and Exemplify BioPharma also provided financial support. 28 teams of up to 12 students from 18 different high schools in New Jersey competed in 10 different events. Twenty-one judges and numerous other volunteers were on hand to help make this a fantastic success.

(All photos courtesy of Tom Krone.)



In the end, Team A from John Paul Stevens High School (JPSHS) in Edison took home the platinum crucible as well as 2 gold and 1 silver medal. The team from Bergen County Academies in Paramus came in second overall and took home 2 gold and a bronze medal. Primoris Academy in Westwood took third place in their first Olympics. 67% of the teams won at least one medal. The two teams from JP Stevens and the two teams from Pascack Hills High Schools both won 5 medals; the most medals won by any school.

The Events

Research Events: 1 – 3: Students have to do research on a given topic, submit research reports to the judges ahead of the event and then present their findings to the judges on Olympics Day. The event takes months of preparation on the part of the students and the judges diligently read through every report and ask questions on event day.

Event 1: The Chemistry of Chocolate.

Designed and judged by Dr. Alisa Krishtal (NJIT, Chem.). Students had to synthesize the edible as well as two inedible forms of chocolate and explain the chemistry involved. Bergen County Academies took first place, Watchung Hills Regional HS Team A took second and South Brunswick Team A took third place.



Event 2: Bioplastics.

Dr. Alexei Kazilov (NJIT, Environmental Sci.) who designed the event was joined by Dr. Joseph Bozzelli (NJIT) for the judging. JP Stevens Team A came in first for their research into forming eco-friendly bioplastics from discarded banana peels, James Caldwell Team A came in second, and Princeton International School of Mathematics and Science (PRISMS) took



Event 3: Chem-E Car.

The car travels a given distance fueled only by a chemical reaction. Design of the project was done by Dr. Duane Butherus (NJIT, Chem.). He was joined in judging by other NJIT faculty members: Dr. Reginald Tomkins (NJIT, Chem. E.) and Dr. Mirko Shoenitz, (NJIT, Mech. E).

Event 4: Pizza Web Design.

Dr. Arthur Hendela (Hendela Systems Consultants Inc.; NJIT) designed the event. Dr. Kathleen Gilbert (NJIT, Chem.) joined him in judging the event. South Brunswick Team A took first place, Pascack Hills High School Team B came in second and James Caldwell Team A came in third..



Event 5: Demonstration.

This year's event was on polymerization. Dr. Michael Bonchonsky (NJIT, Environmental Sci.) was joined by Mr. Jason Anesini (PhD student, Olympics alumni) in judging the event. Watchung Hills Regional HS Team B took home first place, Dwight Englewood came in second, and the Primoris Academy came in third

Event 6: Chemical Nomenclature (an online test).

Judged by Dr. Mustansar Hussain (NJIT, Safety) and Dr. Ara Kahyaoglu (Bergen Community College) Most teams competed in this event but Primoris Academy took home the gold medal. James Caldwell Team A came in second, and Bergen County Academies took third.

Event 7: Molecular Modeling.

This year the molecules were all flavors. Molecules are judged based on the accuracy of the model and each team's ability to answer questions based on its structure and what they researched about its function. Judging the event were Dr. Yong-Ick Kim (NJIT, Chem.), Ms. Mihaela Cohanoschi (NJIT, CSLA Dean's Office), and Mr. Raymond Vasquez (NJIT, library). This was Ray's first Olympics. Pascack Hills High School Team A took home the gold, JP Stevens Team A took second, and Pascack Hills High School Team B took



Laboratory Events: 8 – 10: Students must carry out laboratory work to solve the posed problem. The event is timed. Strict attention to safety procedures is also part of their score.



Event 8: Analytical - determine the amount of caffeine in a supplied energy drink.

This event was written by Ms. Christina Roros (Whippany Park High School) and Dr. Miriam Gulotta (NJIT, Chem.). Judging the event were Dr. Alan Cooper (NJACS) along with Ms. Jenn Stern (College Biology major, Olympics alumni). Bergen County Academies took first place, Sparta High School Team B took second, and Montclair High School took third. This is the first Olympics Montclair has participated in after a very long absence. Welcome Back!



Event 9: Challenged students to turn their smart phones into a visible absorbance spectrometer and to determine the concentration of solutions containing copper II ions, nickel II ions, or silver ions.

The event was designed by Ms. Carrie Jacobus (NJCO director). Joining Ms. Jacobus in judging was Mr. Joydeep Chakraborty (NJIT, Chem.). Taking home the gold medal was Sparta High School Team A. Primoris Academy came in second and JP Stevens Team B took third.

Event 10: Microscale lab.

This year the task was to determine the amount of calcium carbonate in an unknown antacid tablet. Dr. Bhavani Balasubramanian (NJIT, Chem.) designed the event and was joined in judging by Ms. Diane Krone (NJACS, AACT). The gold was taken by JP Stevens Team A, the silver by Team B of the same school, and Passack Hills Team a took home the bronze.



For additional information about the competition's 2018 medal winners, participating schools and advisors, event descriptions and more, visit: <http://njchemistryolympics.com>

NORTH JERSEY CANDIDATES

The following are candidates for 2019 chair-elect and councilors for the North Jersey Section:

Chair-Elect

Cecilia Marzabadi
Steven Silverman
Yingchun (Jasmine) Lu

Councilor (4 councilors and 4 alternates)

Diane Krone
Monica Sekharan
Michael Miller
John Piwinski
Ron Kong
Miriam Gulotta
Susan (Sue) Fahrenholtz
Raymond (Ray) Baylouny

The election will take place from **September 14 - October 26, 2018**. Voting will be by electronic ballot.

Call for Abstracts

You are kindly invited to contribute scientific research posters to the 2018 North Jersey Chromatography Group Symposium. Abstracts are currently being accepted for poster presentations. All abstracts must be submitted to: njcg1234@gmail.com (cc: rmenger@celgene.com). Please use "2018 NJCG Symposium – Poster Abstract" as your e-mail subject. Please include the title of abstract, author(s), affiliation, and contact information in your abstract. The abstract should not be more than 250 words. The submission deadline is **Friday, August 31, 2018**.

Call for Volunteers

OPPORTUNITY FOR ACS MEMBERS TO AID STUDENTS 2 SCIENCE IN A HYBRID VIRTUAL LAB PROGRAM

Can you spare a few hours of your time? Do you like working with students and would you like the opportunity to share your science knowledge in a classroom? Students 2Science (S2S) is seeking volunteers to support its V-Lab program. S2S has a series of elementary, middle, and high school experiments that run in various schools across New Jersey. Members are especially needed to mentor students in participating schools to help with experiments. It's great fun, a wonderful way to give back, and only requires 1-2 hours of your time. Experiments include CO₂ to the Rescue, Curious Crystals, Mystery of M&Ms, Thermochemistry: *Exothermic and Endothermic Chemical Reactions*, and *Glow it Up: The Chemistry of Luminol*. All are age-appropriate and volunteers are provided with instructions on how to support in the classroom prior to your scheduled volunteer day.

For more information, contact Cyndi Roberson, Director of Corporate Relations, at (973) 947-4880 ext. 516 or visit the website to register for the upcoming school year: www.students2science.org.



SEMINAR SPEAKERS WANTED

The New York Section of the ACS is in search of speakers that we can add to our Speakers Bureau database of interested local area speakers who are available for Section-wide seminars and symposia. If you have an area of research or interest that would provide an interesting talk appropriate for our Section members, and would like to be included in our Speakers Bureau, please contact the New York Section Office at (516) 883-7510 or send an email to njesper1@optonline.net with the following information that will be posted on the Section's website: your name, affiliation, a title, and 5-6 words briefly summarizing your area of specialty. We look forward to hearing from you about topics that you wish to share with our other members!

Call for Applications

FREDDIE AND ADA BROWN AWARD

This Award recognizes and encourages high achieving middle- and high-school students, of African American and Native American heritage, to further develop their academic skills, with views on careers in the chemical sciences.

Award Amounts

Middle School \$100.00 Check and \$50.00 gift certificate : High School \$200.00 Check and \$100.00 gift certificate.

Who is Eligible

Middle School students enrolled in a science class : High School students who have completed a chemistry course

Grades

Middle School B Average or better in Science, B Average overall : High School B Average in Chemistry, B Average overall

Letter of Recommendation

Math or Science/Chemistry Teachers or Guidance Counselor

Statement

Middle School "Why I Like Science" : High School "Why I Like Chemistry"

Selection Criteria

Applicants must be African American (Black) or Native American (including Pacific Islander) or of mixed race.

Transcript

Official transcript required.

Financial Need

Not Required.

Applications available on the web:

www.njacs.org/freddieadabrown

or from your school guidance office.

Return Application To

Freddie and Ada Brown Award, NJACS Section Office, 49 Pippens Way, Morristown, NJ 07960

Due Date

Completed Applications must be post-marked no later than March 31 Annually

Questions: Contact Jeannette Brown Jebrown@infionline.net or (908) 239-1515

Call for Applications

OPEN-NJ Scholarship Program Department of Chemistry and Biochemistry



MONTCLAIR STATE
UNIVERSITY

Receive one of the scholarships (\$10,000/year for 2 or 3 years) to enter one of the following programs at Montclair State University

- *Masters in Pharmaceutical Biochemistry*
- *Masters in Chemistry*
- *Masters in Chemistry with a Concentration in Biochemistry*

This program is open for the following majors: Biochemistry, Chemistry, Physics, Molecular Biology, Biology, Environmental Sciences, and related degrees (B.A., B.S.).

Summer Research Stipends available for highly qualified students.

Information: <https://www.montclair.edu/csam/open-nj/>

<https://www.montclair.edu/graduate/news/article.php?ArticleID=16127>

Requirements for Program

- Minimum overall 3.0 GPA (B.S. or B.A. degree)
- Completed General Chemistry I (with lab), General Chemistry II (with lab), Organic Chemistry I (with lab), Organic Chemistry II, Calculus I and II and a year of Physics.
- US citizen, national, admitted refugee or permanent resident
- Enrolling full time in an MSU Department of Chemistry and Biochemistry M.S. program
- Financial aid eligible as determined by the Office of Financial Aid.
- Committed to participating in all OPEN-NJ meetings including networking events.

Apply

Apply to the Graduate Program at Montclair State University (<http://www.montclair.edu/graduate/>) AND email Dr. Nina Goodey (goodeyn@mail.montclair.edu) to indicate interest in the OPEN-NJ Scholarship Program. The OPEN-NJ Selection Committee will use your graduate school application.

Questions?

Please, email Dr. Nina Goodey (goodeyn@mail.montclair.edu).



Call for Nominations

COMMITTEE ON THE HISTORY OF THE NEW YORK SECTION

Over the past twenty-three years the New York Section has participated in the designation of seven National Historic Chemical Landmarks and four New York Section Historic Chemical Landmarks. A brief description of these National and local section landmarks may be found on the NY Section Home Page at newyorkacs.org under the Committee on the History of the NY Section. These landmark programs recognize achievements in the chemical sciences and related areas, in order to enhance public appreciation for the contributions of the chemical sciences to modern life.

Please consider making a nomination for an historic chemical landmark. The Committee on the History of the NY Section will consider all nominations. In addition to a particular achievement, an historic library, building or association may be worthy of this distinction.

Please send your nomination, with supporting documentation, to the Chair of the Committee, Dr. Neil Jespersen, at jespersn@stjohns.edu.

Grants Available

The Committee on Corporation Associates (CA) invites ACS Local Sections and International Chapters to apply for grants to support their industry-focused events, including job fairs or panel discussions with industry leaders. For more information, visit the CA Local Section and International Chapter Grants webpage.

CA also offers SEED grants to support programs or events focused on education in the chemical sciences, education of the public on the role of the chemical industry, and promotion of professionalism or safety in chemistry. To apply, visit the CA SEED Grant webpage.

Deadline for submissions is July 1, 2018 and winners will be notified no later than **September 15, 2018**.

In the News

IDTechEx RESEARCH

Miniaturised Gas Sensors Open New Markets Finds New IDTechEx Research Report

There is an increasing demand for monitoring environmental air conditions both indoors and outdoors, as poor air quality is a growing threat to the public health. It has caused more deaths annually than HIV/AIDS and malaria combined. Citizens are increasingly aware of this problem and are seeking low cost and user-friendly solution to monitor the air condition. This rising need will lead to a market of more than \$3 billion by 2028, which is analysed and forecasted by the recently updated IDTechEx Research report Environmental Gas Sensors 2018-2028.

In the Environmental Gas Sensors 2018-2028 report, we have focused on six major emerging market segments:

- Automotive
- Smart devices
- Wearable devices
- Smart home
- Smart city
- Air purifiers

The automotive industry currently dominates the gas sensor market with the goal of automating air flow into the drivers' compartment. Automotive industry will remain an essential segment for the gas sensor in the coming years. However, IDTechEx expects to see a large rise in sales towards the integration of gas sensors with mobile and wearable devices. These devices will allow consumers to monitor the air conditions dynamically and then encourage them to take appropriate action Instantaneously.

Gas sensors will also play a key role in Internet of Things (IoT) development and will be used extensively in households and cities connected with digital technologies. Heating, ventilation and air conditioning (HVAC) systems, air purifiers, smart windows and other applications will employ sensors to improve

These new markets have emerged because new manufacturing methods are enabling the fabrication of smaller, lower power and more selective sensors.

Microelectromechanical systems (MEMS) and screen printing techniques facilitate the miniaturisation of gas sensors, which is the key to integrate gas sensors into consumer electronics, such as mobile phones and wearable devices.

See www.IDTechEx.com/egs for more.