

# THE Indicator

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## **Dr. Debra R. Rolison 2018 Nichols Medalist**



*See Article on Page 5.*

## THIS MONTH IN CHEMICAL HISTORY

Harold Goldwhite, California State University, Los Angeles • [hgoldwh@calstatela.edu](mailto:hgoldwh@calstatela.edu)

One hundred years ago the Nobel Prize in chemistry for 1918 was announced. The Laureate was the German physical chemist, Fritz Haber. The award was controversial. For one thing the Great War involving Germany was still in progress (though it had only a few weeks to run before the armistice of November 1918 was agreed to). And for other reasons, which will become clear below, Haber was a controversial choice for his wartime activities on behalf of his country. Indeed Haber himself had expressed doubts about his eligibility for the Prize.

Haber was born in Breslau in December 1868 into a nominally Jewish family; his father was a prosperous dyestuffs supplier. Haber was an indifferent student in his early years. He migrated from one university to another (Heidelberg, Berlin, Charlottenburg, and Zurich). He finally decided on chemistry and chemical technology and worked at Jena with Knorr on organic chemistry, which led to a publication. In 1894 he moved to Karlsruhe's Institute of Chemical Technology as an assistant. He worked on a number of technical processes involving hydrocarbons, and was promoted to Privatdozent in 1896. He published a well-received book on electrochemistry in 1898 and was later one of the inventors of the glass electrode.

In 1901 Haber married a brilliant young chemist, Clara Immerweh; the marriage became strained after a few years and the birth of a son. Haber's work turned to the thermodynamics of a range of technical gas reactions, and he published a book on the subject in 1905 which included a description of the direct reaction between nitrogen and hydrogen to produce small amounts of ammonia. Haber decided to explore this reaction more fully. Its importance was obvious. Agriculture depended substantially on the application of fertilizers containing nitrogen to improve crop yields. A large tonnage of guano from sea birds was imported into Europe from South America. A domestic chemical source of ammonia would be cheaper and more reliable.

Haber optimized the ammonia reaction by running it at 500°C at 150 – 200 atmospheres with an iron catalyst. (This reaction is a classic example of Le Chatelier's principle in which thermodynamics and kinetics are finely balanced.) To run such a reaction industrially needed the expertise of a chemical engineer: Carl Bosch of BASF. The company built a factory which began production in 1914 – a significant year that marked the beginning of the Great War.

Haber and Bosch had provided a cheap way for farmers to increase crop yields, thus making food cheaper and more readily available initially in Germany, but soon throughout the world. Today it is estimated that some 50% of the world's food supply depends on the availability of artificially produced nitrogen fertilizers. This is the achievement that led to the award of the Nobel Prize to Fritz Haber and, later to Carl Bosch.

So why was the award controversial? Haber was a German patriot, and had done reserve duty in the army. When war broke out he volunteered his services. He enthusiastically endorsed an idea that had been put forward earlier but had been "outlawed" by the Hague Peace Conference of 1899, namely the use of incapacitating gases to put enemy soldiers out of action. Haber argued that gas warfare should be tried and eventually, in April 1915, the German army at Ypres, when the wind was favorable, released nearly 200 tons of chlorine gas towards the Allied troops. The gas attack was a success; 10,000 soldiers were affected, about 5,000 were killed, and 2,000 more were captured. War gases had come to stay. Within a few months the Allies had their own stores of chlorine, and a little later both sides developed a range of mustard gases that were more damaging, and more reliable, than chlorine. Haber can be regarded as the father of chemical warfare.

Haber's ammonia synthesis was also instrumental in generating weapons of war. Some years earlier Ostwald had worked out the conditions for oxidizing ammonia to produce nitric acid. This was essential for the production of various explosives including TNT and cordite. So Germany, freed from the necessity of trying to import nitrates on shipping that would have to run the blockade of the British navy, became self-sufficient in nitric acid because of Haber's discoveries.

Haber's first wife, Clara, committed suicide in 1916 for reasons that are not clear. He remarried 18 months later, but that second marriage ended in divorce in the 1920s. After the war

*(continued on page 14)*

**THE INDICATOR****Manager / Editor** - LINDA ATKINS

3137 Hemlock Hill Road

Pocono Pines, PA 18350

973-981-4383

[indicator.linda@gmail.com](mailto:indicator.linda@gmail.com)**Advertising Manager** - VINCENT GALE

MBO Services, PO Box 1150

Marshfield, MA 02050-1150

781-319-7779

[vincegale@mboservices.net](mailto:vincegale@mboservices.net)**INDICATOR COMMITTEE****Chair, DR. LES McQUIRE**

17 Crown Drive, Warren, NJ 07059

908-334-5473

[Les@LesMcQuire.org](mailto:Les@LesMcQuire.org)**New York Section Rep.****DR. NEIL JESPERSEN**

Chemistry Dept., St. John's University

8000 Utopia Parkway, Queens, NY 11439

718-990-5221

[njespersn@stjohns.edu](mailto:njespersn@stjohns.edu)**North Jersey Section Rep.****JACQUELINE ERICKSON**

GSK, 184 Liberty Corner Rd., Warren, NJ 07059

973-713-8303

[jacqueline.a.erickson@gsk.com](mailto:jacqueline.a.erickson@gsk.com)**Web Masters****NY Section** - DR. BRIAN R. GIBNEY[postmaster@newyorkacs.org](mailto:postmaster@newyorkacs.org)**NoJ Section** - PAUL TUKEY[tukey@verizon.net](mailto:tukey@verizon.net)**NEW YORK SECTION**

Marilyn Jespersen, Office Administrator

<http://newyorkacs.org>**Chair, DR. JOSEPH M. SERAFIN**

Dept. of Chemistry, St. John's University

8000 Utopia Parkway, Queens, NY 11439

718-990-5226 • [serafinj@stjohns.edu](mailto:serafinj@stjohns.edu)**Chair-Elect, DR. JUSTYNA WIDERA-****KALINOWSKA**

Dept. of Chemistry, Adelphi University

1 South Street, Garden City, NY 11530

516-877-4135 • [widera@adelphi.edu](mailto:widera@adelphi.edu)**Secretary, DR. DANIEL AMARANTE**

Division of Natural Sciences, College of Mount

Saint Vincent, 6301 Riverdale Avenue,

Riverdale, NY 10471 • 718-405-3389

[daniel.amarante@mountsaintvincent.edu](mailto:daniel.amarante@mountsaintvincent.edu)**Section Office**

St. John's University, Chemistry Dept.

8000 Utopia Parkway, Queens, NY 11439

516-883-7510; Fax 516-883-4003

[njesper1@optonline.net](mailto:njesper1@optonline.net)**NORTH JERSEY SECTION**<http://www.njacs.org>**Chair, DR. MIRIAM GULOTTA**

1 Parkside Terrace, Apt. 2D, Woodland Park, NJ

07424-2750

973-345-7111 • [mgulotta@acs.org](mailto:mgulotta@acs.org)**Chair-Elect, DR. AMJAD ALI**

Senior Principal Scientist, Merck and Co. Inc.

2000 Galloping Hill Rd., Kenilworth, NJ 07033

908-740 3407 • [amjad\\_ali@merck.com](mailto:amjad_ali@merck.com)**Secretary, BETTYANN HOWSON**

49 Pippins Way, Morris Township, NJ 07960

973-822-2575 • [chemphun@gmail.com](mailto:chemphun@gmail.com)**Section Office**

49 Pippins Way, Morris Township, NJ 07960

973-822-2575 • [chemphun@gmail.com](mailto:chemphun@gmail.com)**THE Indicator** 

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**CONTENTS**

Advertisers' Index	32
Call for Abstracts	30
Call for Applications	28-29
Call for Nominations	26
Call for Papers	27
Call for Volunteers	28
In the News	30-31
MARM	25
New York Meetings	13-20
Nichols Symposium	5-7
North Jersey Meetings	8-9
Professional/Product Director	32

**EDITORIAL DEADLINES**

May	March 28
June	April 28
September	July 28
October	August 28
November	September 28
December	October 28
January 2019	November 28, 2018
February 2019	December 28, 2018
March	January 28, 2019
April	February 28

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## April Calendar

### NEW YORK SECTION

**Wednesday, April 4, 2018**

MetroWomen Chemists  
See page 14.

**Friday, April 13, 2018**

Nichols Symposium  
See pages 6-7.

**Tuesday, April 17, 2018**

Biochemical Topical Group  
See page 14.

**Thursday, April 19, 2018**

Long Island Subsection  
See page 15.

**Friday, April 20, 2018**

Hudson-Bergen Chemical Society  
See page 16.

**Friday, April 20, 2018**

High School Teachers Topical Group  
See page 17.

**Sunday, April 22, 2018**

Chemists Celebrate Earth Day  
See pages 17-18.

**Wednesday, April 25, 2018**

NY/NJ Society for Applied Spectroscopy  
See page 17.

**Thursday, April 26, 2018**

Westchester Chemical Society  
See page 19.

**Friday, April 27, 2018**

Long Island Subsection Chem. Challenge  
See page 20.

*also*

**Saturday, May 5, 2018**

Undergraduate Research Symposium  
See page 21.

**Wednesday, May 23, 2018**

NY/NJ Society for Applied Spectroscopy  
See page 17.

**Tuesday, June 19, 2018**

Chemical Marketing and Economics Group  
See page 22.

### NORTH JERSEY SECTION

**Wednesday, April 11, 2018**

NMR Topical Group  
See page 8.

**Monday, April 16, 2018**

North Jersey Executive Committee Meeting  
See page 8.

**Wednesday, April 25, 2018**

NY/NJ Society for Applied Spectroscopy  
See page 8.

**Thursday, April 26, 2018**

Drug Metabolism Discussion Group  
See pages 8-9.

**Friday, April 27, 2018**

North Jersey Section's 70th Annual  
Undergraduate Research Conference  
See page 30.

*also*

**Wednesday, May 23, 2018**

NY/NJ Society for Applied Spectroscopy  
See page 8.

**The Indicator is posted to the web  
around the 15th of the previous month at  
[www.TheIndicator.org](http://www.TheIndicator.org)**

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

**March 28, 2018**

## Dr. Debra R. Rolison, 2018 Nichols Medalist

The ACS New York Section congratulates and extends its best wishes to Dr. Debra R. Rolison of the U.S. Naval Research Laboratory who will receive the William H. Nichols Medal Award on April 13, 2018 in White Plains, New York. The Nichols Medal is presented at an Award Dinner following the Nichols Distinguished Symposium. The title of the Distinguished Symposium is "The Future of Energy Science ... Without Chemists? Unachievable!" Dr. Rolison is being honored for "Pioneering Energy Relevant 3D Nanoarchitectures."

Dr. Debra Rolison heads the Advanced Electrochemical Materials section (also known as the U.S. Navy's nanoarchitectural firm) at the U.S. Naval Research Laboratory in Washington, DC. Her team designs, synthesizes, characterizes, and applies three-dimensionally structured, ultraporous, multifunctional nanoarchitectures for such rate-critical applications as catalysis, energy storage and conversion, and sensors. Along with Bruce Dunn (UCLA), Jeffrey Long (NRL), and Henry White (University of Utah), she established a new sub-discipline in electrochemical science: three-dimensional (3D) electrochemical energy storage in which battery function is volumetrically integrated within the cell rather than layered in 2D.

Dr. Rolison was a Faculty Scholar at Florida Atlantic University (1972–1975), where she worked with Frank Schultz on nonaqueous ion-selective electrodes and the electrochemistry of  $\mu$ -sulfido molybdenum complexes before receiving her B.S. in Chemistry in 1975. She also spent a summer in 1974 as an undergraduate research intern in William Dolbier's group at the University of Florida. She then entered the graduate chemistry program at the University of North Carolina at Chapel Hill, where she joined the group of Royce Murray just as chemically modified electrodes were being invented. Dr. Rolison received her Ph.D. in Chemistry from UNC in 1980 after demonstrating the Pt-like character of RuO<sub>2</sub> electrodes in nonaqueous electrolytes, helping to establish polymer-modified electrodes, and ensuring frequent pick-up games of killer volleyball; she then immediately joined the NRL as a staff scientist until founding the Advanced Electrochemical Materials section in 1999.

Dr. Rolison is a Fellow of the American Association for the Advancement of Science, the Association for Women in Science, the Materials Research Society, and the American Chemical Society. Among her major awards, she received the Department of the Navy Dr. Dolores M. Etter Top Scientist & Engineer Team Award (2016), the ACS Division of Analytical Chemistry Award in Electrochemistry (2014), the Charles N. Reilley Award of the Society for Electroanalytical Chemistry (2012), the ACS Award in the Chemistry of Materials (2011), and the Hillebrand Prize of the Chemical Society of Washington (2011).

Her editorial advisory board service includes: *Chemical Reviews*, *Analytical Chemistry*, *Langmuir*, *Journal of Electroanalytical Chemistry*, *Advanced Energy Materials*, and the inaugural boards of *Nano Letters*, the *Encyclopedia of Nanoscience and Nanotechnology*, and *Annual Review in Analytical Chemistry*. Dr. Rolison also writes and lectures widely on issues affecting women (and men!) in science, including proposing Title IX assessments of science and engineering departments. She is the author of over 225 articles and holds 35 patents.



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## 2018 WILLIAM H. NICHOLS MEDAL DISTINGUISHED SYMPOSIUM AND AWARD DINNER

**Symposium: "THE FUTURE OF ENERGY SCIENCE ... WITHOUT CHEMICALS? UNACHIEVABLE!"**

**Award Recipient: DR. DEBRA R. ROLISON**

Date: Friday, April 13, 2018

Place: Crowne Plaza Hotel, White Plains, NY

### PROGRAM

- |         |   |  |
|---------|---|--|
| 1:00 PM | Welcome   | Dr. Joseph M. Serafin<br>2018 Chair, ACS, New York Section<br>St. John's University            |
| 1:05 PM | Opening of the Distinguished Symposium  | Dr. Justyna Widera-Kalinowska<br>2018 Chair-elect, ACS, New York Section<br>Adelphi University |
| 1:15 PM | Designing Transition Metal Phosphide Nanoparticles and Composites for Effective Electrocatalytic and Photocatalytic Water Splitting | Dr. Stephanie L. Brock<br>Department of Chemistry<br>Wayne State University                    |

Transition metal phosphides are of considerable research interest for the wide range of catalytic functions they imbue. These include hydrodesulfurization of fossil fuels, hydrodeoxygenation of biofuels, and electrocatalytic water splitting reactions, among others. However, the functionality of the phosphide is sensitively dependent on composition, structure and particle size. In order to better understand the roles of structure, electronics, and surface chemistry on catalytic activity and stability, synthetic methods that enable composition, structure, and size to be targeted, and that yield low-polydispersity samples, are needed. In this presentation, the synthesis of bimetallic manganese and ruthenium phosphide nanoparticles  $M_2-xM_nxP$  ( $M = Fe, Co$ ) and  $Ni_2-xRuxP$  will be described and their composition-dependent activity for electrocatalytic water oxidation presented. The role of structure, site occupancy, and electronic considerations on functionality will be discussed in the context of designing more active and stable electrocatalysts. Finally, as a means to translate electrocatalytic activity into photocatalytic activity, the design of porous nanoparticle assemblies that blend phosphides with light-harvesting sulfide nanoparticles will be described and their efficacy for photocatalytic water reduction discussed in light of interfacial characteristics. The talk will conclude with a discussion of the importance of rational nanomaterials synthesis and design in addressing 21st century energy and environmental needs.

- |         |  |   |
|---------|--|---|
| 2:00 PM | Modulating Proton-Coupled Electron Transfer Mechanisms for the Efficient Production of Fuels | Dr. Jillian L. Dempsey<br>Department of Chemistry<br>University of North Carolina-Chapel Hill |
|---------|--|---|

Molecular transformations of interest for solar fuel production are underpinned by proton-coupled electron transfer (PCET) reactions. To optimize efficiency in the catalytic reactions that mediate fuel production, this proton-electron reactivity must be carefully orchestrated. Our group utilizes a combination of electrochemical methods and time-resolved spectroscopy to elucidate the mechanisms of PCET reactions in both transition metal-based hydrogen-evolving catalysts and model systems. By systematically examining the influence of various reaction parameters—including catalyst structure, ligand electronics and proton source—on the PCET mechanisms and the kinetics of their elementary reaction steps, we are revealing how the PCET reaction space can be intentionally traversed. These findings are providing the blueprints for next-generation catalyst design.

- |         |  |   |
|---------|--|---|
| 2:45 PM | Coffee Break                                       |   |
| 3:15 PM | Operando Methods for the Study of Energy Materials | Dr. Héctor D. Abruña<br>Department of Chemistry and Biochemistry<br>Director, Energy Materials Center and<br>Émile M. Chamot Professor of Chemistry |

This presentation will deal with the development of operando methods for the study and characterization of fuel cell and battery materials. The presentation will begin with a brief overview of the methods employed. Particular emphasis will be placed on the use of X-ray diffraction (XRD), X-ray absorption spectroscopy (XAS) X-ray microscopy and tomography and transmission electron microscopy (TEM) all under active potential control. The utility of these methods will be illustrated by selected examples including electrocatalysts for the oxygen reduction reaction and spectroscopic studies of Li/S batteries and lithium dendrite formation dynamics. The use of operando TEM will be illustrated by studies of fuel cell catalyst degradation and coalescence and lithiation/de-lithiation dynamics of  $LiFePO_4$  via energy-filtered TEM. Finally the concept of symmetrical redox flow batteries will be demonstrated. The presentation will conclude with an assessment of future directions.

4:00 PM Architectural Design, 1D Walls, 3D Plumbing, and Painting Blind en Route to Dr. Debra R. Rolison  
 Multifunctional Nanoarchitectures for Energy Storage Head - Advanced Electrochemical  
 Materials Section, U.S. Naval Research Laboratory

Our team at the Naval Research Laboratory looks at rate-critical chemical processes where events per second are required for high performance in such technologies as energy storage, energy conversion, (electro)catalysis, and sensing. We then design next-generation systems built around pore–solid nanoarchitectures that seamlessly embody all of the requisite rate functions for high-performance electrochemistry: molecular mass transport, ionic/electronic/thermal conductivity, and electron-transfer kinetics. We have taken the lessons from 20 years of probing the operational and design characteristics of catalytic and energy-relevant nanoarchitectures to create a zinc sponge—a stand-alone, 3D-wired anode that improves current distribution within the electrode structure during charge–discharge cycling, thwarts dendrite-formation, and can challenge the energy density of Li-ion battery packs, all while using safer aqueous-based chemistry. With this breakthrough, we are now addressing the family of zinc-based rechargeable alkaline batteries: nickel–3D zinc, silver–3D zinc, MnO<sub>2</sub>–3D zinc, and even rechargeable 3D zinc–air. The route we have taken to move from a creative concept to a fabricated reality to the necessary fundamental characterization to prototype development (and ultimately commercialization by outside companies) will be described.

### MEDAL AWARD BANQUET

**5:15 p.m. Social Hour**

**6:15 p.m. Medal Award Dinner**

**Presiding:** **Dr. Joseph M. Serafin**  
 2018 Chair, ACS New York Section  
 St. John's University

**ACS Greetings:** **Dr. Peter K. Dorhout**  
 2018 President  
 American Chemical Society

**Introductory Address:** **Dr. Henry S. White**  
 University of Utah

**Presentation of the Medal:** **Dr. Joseph M. Serafin**

**Acceptance Address:** **Dr. Debra R. Rolison**  
 Nichols Medalist

For More Information: Please visit the New York Section website at [www.NewYorkACS.org](http://www.NewYorkACS.org)

Online registration using PAYPAL for payment is available at  
[www.newyorkacs.org/meetings/Nichols/2018Nichols.php](http://www.newyorkacs.org/meetings/Nichols/2018Nichols.php)

Or use the Tear Off reservation form at this line **BANQUET RESERVATIONS DEADLINE – April 4, 2018**

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<b>Symposium only:</b>	<b>\$65 (\$45 for ACS Members)</b>	_____	\$ _____
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<b>Symposium &amp; Banquet:</b>	<b>\$160 (\$130 for ACS Members)</b>	_____	\$ _____
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Enclosed is my check, payable to: **NEW YORK SECTION, ACS** in the amount of \$ \_\_\_\_\_

If reservations are for more than one person, please attach a list of the guests' names, and dinner selections where needed.

**DINNER CHOICES:** Chicken \_\_\_\_\_ Prime Rib \_\_\_\_\_ Salmon \_\_\_\_\_ Vegetarian \_\_\_\_\_

**Tickets will be mailed to the person designated below**

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## North Jersey Meetings

<http://www.njacs.org>

### NORTH JERSEY EXECUTIVE COMMITTEE MEETING

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.

**Date:** Monday, April 16, 2018

**Time:** 6:30 PM

**Place:** Rice Lounge  
Fairleigh Dickinson University  
Florham Campus  
285 Madison Avenue  
Madison, NJ 07940

(See [www.njacs.org](http://www.njacs.org) for more details.)



### CAREERS IN TRANSITION MEETINGS

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



### NMR TOPICAL GROUP

**Speaker:** Alan Gibbs, PhD  
Principal Scientist  
Janssen Pharmaceuticals

**Date:** Wednesday, April 11, 2018

**Times:** 6:00 - 8:00 PM

**Place:** Princeton University

### NEW YORK/NEW JERSEY SOCIETY FOR APPLIED SPECTROSCOPY

“Laser-induced Breakdown Spectroscopy (LIBS) Addition to Microscopic Analyses and Raman and IR of Particles.”

**Speaker:** Dr. Markus Lankers  
Rap.ID GmbH

**Date:** Wednesday, April 25, 2018

See [www.nysas.org](http://www.nysas.org) for details.

\*\*\*\*\*

### FUTURE MEETING

“Application of FTIR in Understanding the Changes in Protein Secondary Structure as a Result of Stress”

**Speaker:** Dr. John Wasyluk  
Bristol-Myers Squibb Company

**Date:** Wednesday, May 23, 2018

See [www.nysas.org](http://www.nysas.org) for details.



### NoJ DRUG METABOLISM DISCUSSION GROUP

Past, Present and Future of ADME Science in Academia, Industry and Regulations

**Chaired by:** Manthena Varma  
Pfizer

**Date:** Thursday, April 26, 2018

**Time:** 8:00 AM - 3:45 PM

**Place:** The Palace at Somerset Park  
333 Davidson Avenue  
Somerset, NJ

<http://palacesomersetpark.com>

**Cost:** Pre-registration is \$125 and \$150 at the door. Students and postdocs are charged \$10, and faculty are charged \$50. Registration is free for unemployed.



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For more information about the meeting or to learn more about the Discussion Group, please check out the Group's website <http://www.njacs.org/topical-groups/drug-metabolism>

Additional information will be posted on the website.



## **NORTH JERSEY SECTION'S 70th ANNUAL UNDERGRADU- ATE RESEARCH CONFERENCE**

**Date:** Friday, April 27, 2018

**Times:** 11:30AM until 4:30 pm

**Place:** New Jersey Institute of  
Technology

*For complete information, see page 30.*



## **NMR TOPICAL GROUP**

The NJ-ACS NMR Topical Group held its February meeting on the evening of Thursday, February 8th at Princeton

University. The Group hosted Robert Powers, a professor at the University of Nebraska-Lincoln and alumnus of Rutgers University. Bob spoke to the crowd on his team's usage of both NMR spectroscopy and mass spectrometry to conduct metabolomics studies in the context of drug discovery. Bob demonstrated how metabolomics can uncover molecular mechanisms of drug resistance and also serve as a tool for disease diagnosis. Another great turnout of 22 attendees was had, including several of Bob's family members, local to central New Jersey. Great food, wine, science, and door prizes were once again highlights of the evening.

At Rutgers University on Wednesday, March 7th, we will host Assistant Professor Andrew Nieuwkoop, PhD of Rutgers University, Department of Chemistry & Chemical Biology. A buffet dinner will be served at 6:00 PM followed by Professor Nieuwkoop's seminar at 7:00 PM, entitled "Using Very Fast Spinning and Proton Detection to Solve Protein Structures with Solid-State NMR". We are excited to learn about the research program Andy has been building since joining Rutgers in December of 2016.



**NMR Topical Group's February speaker, Robert Powers, PhD.**

*(Photo courtesy of Mary Harner)*



**Attendance for the NMR Topical Group's February meeting packed the seminar room with 22 participants.**

*(Photo courtesy of Mary Harner)*

## **ESSEX COUNTY COLLEGE CHEMICAL SOCIETY IN COORDINATION WITH NORTH JERSEY SECTION ACS**

### **Biology, Chemistry, & Physics Seminar Series: Creating Strong Safety Culture in the Chemistry Laboratory**

**Date:** Thursday, February 15, 2018

**Place:** Essex County College, Main Campus  
Multi-Purpose Room, 4th Floor, ECC

#### **The event Report:**

The Essex County College Chemical Society along with the Biology, Chemistry, & Physics Seminar Series facilitated a Seminar during its monthly seminar series that took place on Thursday, February 15th, 2018. The seminar was presented by our guest speaker Ms. Bettyann Howson, past Chair of the ACS Committee on Chemical Safety and North Jersey ACS Section Secretary and Councilor. Ms. Howson introduced the Guidelines for Chemical Laboratory Safety in Academic Institutions and shared how to create a strong safety culture in the chemistry labs across the chemistry curriculum. The event was attended by more than seventy people including students, faculty members, the laboratory director and staff.

Dr. Miram Gulotta – of NJIT and the Chair of North Jersey ACS Section – was also present at our event. Dr. Kamunge our Head of the Division of Biology, Chemistry, & Physics greeted the visitors and welcomed the audience at the beginning of our seminar. The event was sponsored by ECS & North Jersey ACS. Dr. Nidhal Marashi of Essex Community College was the event planner.



*(All photos courtesy of Dr. Nidhal Marashi)*





## **NJ-ACS: AN EVENING OF CHEMISTRY AT THE LIBERTY SCIENCE CENTER**

The NJ-ACS section volunteers introduced grade school children to the wonders of paper chromatography at the Community Evening hosted by the Liberty Science Center (LSC) in Jersey City, NJ on January 24th, 2018 from 5:30 – 9 PM. The LSC hosts these Community Evening events for students and families from New Jersey's 31 former Abbott Districts. The LSC opens its doors after hours free of charge to give students from these disadvantaged communities an opportunity to explore the museum, learn about science, and engage in various hands-on-activities. There were over 400 students who attended the event in January according to the LSC organizer, Lauren Rose.

The NJ-ACS volunteers, Drs. Mirlinda Biba, Amanda and Ben Mann, and Mirlinda's daughter, Emma, set up a hands-on activity about paper chromatography. The students separated different color mixtures from coloring markers using filter paper and water. This was a fun experiment for children of all ages and it was great to see their excitement as they were separating the colors. "It is an amazing opportunity to be able to demonstrate the hands-on and fun science activities through our volunteer work with NJ-ACS to these young students and get them excited about science", said Dr. Mirlinda Biba, an Associate Principal Scientist at Merck & Co., Inc.

Acknowledgement: Thanks to Dr. Miriam Gulotta, NJ-ACS Chair, for scheduling the hands-on-activity at the LSC and for her valuable comments and suggestions.



**Dr. Mirlinda Biba and Emma Biba demonstrating the paper chromatography experiment.**

**Dr. Amanda Mann, an Associate Principal Scientist at Merck & Co., Inc., along with her son, August Mann, teaching these young students about color separation.**



**Dr. Ben Mann, an Associate Principal Scientist at Merck & Co., Inc., and Emma Biba, a 5th grade student, helping these students run the experiment.**



*(Photos courtesy of Mirlinda Biba)*

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## New York Meetings

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[www.newyorkacs.org](http://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](mailto:njesper1@optonline.net) or by calling the Section office at (516) 883-7510.

The 2018 Board Meetings will be held at St. John's University, 8000 Utopia Parkway, Queens, NY except for the January 20 Section-wide Conference and April 13 Nichols Symposium. The meeting room will be posted on the New York Section website at [www.NewYorkACS.org](http://www.NewYorkACS.org). Dr. Joseph Serafini 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, June 8, 2018

Friday, September 14, 2018

Friday, November 16, 2018

**Friday, April 13, 2018** - William H. Nichols Distinguished Symposium and Medal Award Banquet, Crowne Plaza Hotel, 66 Hale Avenue, White Plains, NY.

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



### METRO WOMEN CHEMISTS

Please join us for a seminar sponsored by the NY ACS Metro Women Chemists' Committee.

#### Chemistry Through Social Contexts

*Speaker:* Dr. Bhawani Venkataraman  
Associate Professor of  
Chemistry  
Eugene Lang College of  
Liberal Arts, The New School, NY

#### Abstract:

What happens at the molecular level dictates much of the world around us. Yet, Chemistry is a discipline that is often hard for students and the public to relate to. This presentation will start with examples of curricular materials developed to teach chemical principles through social and policy contexts. The goal is for students to recognize why a molecular scale understanding is important to address many current social and environmental challenges – for example access to safe drinking water and air quality. The talk will end by presenting a current project on the development of an interactive and visual educational tool that conducts a comparative analysis of the health, environmental, and social costs and benefits associated with the energy sources used for electrical energy. The intent of the tool is to educate individuals on the complexities of energy sources used for electrical energy and to provide objective comparisons of the pros and cons of these energy sources.

#### Biography:

Bhawani Venkataraman is Associate Professor of Chemistry at Eugene Lang College of Liberal Arts, The New School. Educated as a physical chemist, her research is in the field of chemical education and focuses on understanding ways to engage students in learning chemistry. Currently she is investigating two approaches: 1) the use of software visualization tools to assist students in “seeing” molecules and molecular interactions and in understanding how these microscopic constructs influence the macroscopic world; and 2) the use of contexts as a motivator and learning tool. Another area of her research interest is in understanding what constitutes effective communication of scientific research to non-scientists on issues such as water quality, air pollution and climate change. Bhawani received her B.Sc. in Chemistry from St. Xavier's College, Mumbai, India. She received her M.A., M.Phil. and Ph.D. in Chemistry from Columbia University, New York.

**Date:** Wednesday, April 4, 2018

**Time:** 12:15 PM – 1:15 PM

**Place:** Pace University  
Lecture Hall North (2nd Floor)  
One Pace Plaza  
New York, NY 10038

For further information, please contact Dr. Rita K. Upmacis ([rupmacis@pace.edu](mailto:rupmacis@pace.edu)), Chair of the Metro Women Chemists' Committee.

**BIOCHEMICAL TOPICAL  
GROUP – JOINT MEETING  
WITH THE NYAS BIOCHEMICAL  
PHARMACOLOGY DISCUSSION  
GROUP**

**Advances in Translational Models to  
Study Fibrosis**

**Organizers:** Julie Hawkins, PhD  
Boehringer Ingelheim  
John Hambor, PhD  
Boehringer Ingelheim  
Ignacio J. Juncadella, PhD  
Boehringer Ingelheim  
Scott MacDonnell, PhD  
Regeneron  
Sara Donnelly, PhD  
The New York Academy of  
Sciences  
Sonya Dougal, PhD  
The New York Academy of  
Sciences

**Speakers:** Galina Bogatkevich, MD, PhD  
Medical University of  
South Carolina  
Joseph Bonventre, MD, PhD  
Harvard Medical School  
Robert Lafyatis, MD  
University of Pittsburgh  
Scott MacDonnell, PhD  
Regeneron  
Florian Rieder, MD  
Cleveland Clinic

Katalin Susztak, MD, PhD  
Perelmann School of Medicine  
University of Pennsylvania

Eric White, MD  
University of Michigan  
Medical School

This symposium will review what is known about the cell and molecular biology of fibrosis and reparative healing, discuss current model systems, and consider the challenges and opportunities for future innovation.

**Date:** Tuesday, April 17, 2018

**Time:** 9:00 AM – 6:00 PM

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

**Cost:** This event 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 ACS30. 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/fibrosis2018](http://www.nyas.org/fibrosis2018).

To become a Member of the Academy, visit [www.nyas.org/benefits](http://www.nyas.org/benefits).

**THIS MONTH IN CHEMICAL HISTORY**

*(continued from page 2)*

Haber, as director of the Kaiser Wilhelm Institute of Physical and Electrochemistry in Berlin, assembled a stellar group of scientists and worked assiduously to get support for them. He turned his own attention for some years to a fruitless attempt to extract gold from seawater to pay off Germany's heavy burden of reparations after the Great War.

After 1933, when Hitler came to power, there were wholesale dismissals of Jewish scientists from universities and institutes including Haber's. He himself, though a convert to Christianity back in 1910 and a great patriot during the Great War, was under suspicion. His health had become poor too. Haber resigned in 1933 and, after a short stay in Britain, was on his way to a Swiss sanitarium when he died in Basel in January 1934.

One biographer has described Haber as a modern Faust; a scholar whose work can be used for ends that may be diametrically opposed: both good and bad. Where does Haber lie in that continuum? We must each decide that for ourselves.



## The Long Island Subsection Of the New York American Chemical Society



Proudly Sponsors  
A seminar by:



**Dr. Raquel Decicco,**

*Department of Chemistry, Wagner College, Staten Island, NY 10301*

**Title of Talk:** “Guided inquiry in organic chemistry: Using computational methods to introduce molecule building and geometry.”

**Synopsis:** We developed a guided-inquiry computational activity for sophomore Organic Chemistry, in which students use the Gaussian program to perform simple quantum mechanical calculations to discover the connection between atomic interactions, steric hindrance and isomerism. The activity contains a series of steps for constructing organic molecules, calculating bond angles and lengths, and analyzing the nuclear repulsion and total potential energy of the structures. This process lets students discover the energetic differences between cis and trans isomers of small alkenes. The exercise precedes the lecture introduction of isomers and allows students to build their own understanding of steric hindrance. The traditional lecture is then used to review the concept of isomerism and solve problems to further strengthen student understanding. One of the most essential goals of the exercise to reinforce key concepts of atomic structure and nuclear interactions that govern molecular conformations. Summary questions are included at the end of the activity to emphasize these concepts. Short anonymous surveys were distributed to the class upon completion of the activity, and the feedback that was obtained from the students was overwhelmingly positive. This activity can easily be adopted into any Organic Chemistry I curriculum, and can be modified to fit other software programs.

**All are welcome!**

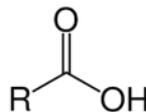
**When:** Thursday, April 19th, 2018

**Where:** Queensborough Community College, Science Building Rm S-112

**Time:** 5:30 p.m. – Social w/ Light Refreshments; 6:00 pm – Seminar Start

**Directions:** <http://www.qcc.cuny.edu/about/driving.html>

**After Seminar Dinner:** At a nearby restaurant, \$25 per person.



American Chemical Society Long Island Subsection  
[http://www.newyorkacs.org/sub\\_island.php](http://www.newyorkacs.org/sub_island.php)

**THE HUDSON-BERGEN  
CHEMICAL SOCIETY, THE  
SIGMA XI CHAPTER AND THE  
SCHOOL OF NATURAL  
SCIENCES OF FAIRLEIGH  
DICKINSON UNIVERSITY**

**The 20th Annual Undergraduate  
Research Symposium**

This is a forum for students and their faculty mentors from colleges and universities that participate in the subsection's activities to present the results of their research. Outstanding graduating students are also being recognized (they receive the Hudson-Bergen Chemical Society Award consisting of a certificate and a book). All the presenters will receive certificates. Students who wish to present posters must send an abstract via e-mail to [mleonida@fdu.edu](mailto:mleonida@fdu.edu), by April 4, 2018. The abstract should be in MS Word format and must include the names and addresses of the student(s) and their faculty adviser(s) in addition to the title of the abstract. The abstract should not exceed 200 words. The name of the student presenting the poster should be underlined. The posters have to be self-supported. There is no registration fee.

This year's symposium also features the lecture:

**Design and Synthesis of Poly(ADP-ribose) Polymerase Inhibitors**

*Speaker* : Dr. Tanaji T. Talele  
St. John's University  
College of Pharmacy and Health  
Sciences

**Abstract**

Compounds that pharmacologically inhibit the nuclear poly(ADP-ribose) polymerase (PARP) family of enzymes are a novel class of anticancer drugs targeting the DNA repair activity of PARP-1, the principle member of the PARP family. The present SAR study is based on our lead compound 1 (Z-2-benzylidene-3-oxo-2,3-dihydrobenzofuran-7-carboxamide), which showed less than desirable PARP-1 inhibition (IC<sub>50</sub> = 12 μM) in a biochemical PARP-1 enzyme assay. The 4-tetrazolyl benzylidene analogue (UTT-24) gave promising enzyme inhibition as evidenced from PARP-1 IC<sub>50</sub> of 35 nM. Since the tetrazole ring in UTT-24 is not amenable for further chemical optimization, we isosterically replaced the tetrazole ring with a carboxyl group (UTT-93, IC<sub>50</sub> = 80 nM), which gave us a new lead for subsequent SAR

studies. Further SAR involved extension of the carboxyl group of new lead UTT-93 to capture additional interactions with the adenine-binding pocket of PARP-1. Consequently, coupling of a carboxyl group of UTT-93 with various adenine-binding heterocyclic amine motifs led to several analogues with PARP-1 IC<sub>50</sub>s ranging from 23 nM – 100 nM.

**Bio note:** Tanaji T. Talele obtained his Ph.D. (1998) in Medicinal Chemistry from the University of Mumbai, India. He was a post-doctoral fellow at UMD-New Jersey Medical School, Louisiana State University, and Moffitt Cancer Center (1999-2005). He joined the SJU's College of Pharmacy and Health Sciences in 2005 where he is currently a Full Professor. He was appointed as an Assistant Chair of the Department of Pharmaceutical Sciences from 2014-2017. He has authored/coauthored 90 peer-reviewed research papers. He has served as a reviewer for three grant agencies: Campbell Foundation FL, National Health and Medical Research Council (NHMRC) of the Government of Australia, and Fondazione Telethon, Italy. Since January 2016 he has been serving as an editorial advisory board member of the European Journal of Medicinal Chemistry (Elsevier publications). Since 2012, he has been serving as an academic editor of *Journal of Chemistry* published by Handawi publishing Corp. His primary research interests include development of small molecule inhibitors of poly(ADP-ribose) polymerase, P-glycoprotein, and *Clostridium difficile*.

**Date:** Friday, April 20, 2018

**Times:** Poster Session — 5:00 PM  
Dinner — 6:00 PM

Awards and Lecture — 7:00 PM

**Place:** Jeepers Café  
Fairleigh Dickinson University  
Teaneck, NJ 07666

**Cost:** \$10.00 for dinner (dinner cost for presenters will be waived).

Reservations: Dr. Mihaela Leonida (201) 692-2338, e-mail: [mleonida@fdu.edu](mailto:mleonida@fdu.edu) by April 16, 2018.

**S U R P R I S E**

our editor by calling and saying you appreciate the quality and content of our newsletter. Our editor works hard to maintain a publication of interest to our membership. Oh, and by the way, you could also give credit to our advertisers who financially support us.

## UFT HIGH SCHOOL TOPICAL GROUP & CHEMISTRY/PHYSICS CLUBS OF NY

### Demo Derby II

Attendees provide demonstrations that should be brief (5 to 8 minutes maximum). Claim your presentation order by writing your name on the board when you enter. This is our second Demo Derby of the year. (The first Demo Derby of each year is held in October.)

Please provide printed instructions for attendees with contact information to help your colleagues replicate your procedures. Remember that our refurbished room 207 no longer has gas, water, or hood. You are responsible for safety, procedures, and cleanup. Please bring enough safety glasses for front row observers.

**Date: Friday, April 20, 2018**

Times: Pre-Meeting Dinner 6:00 PM

Place: DoJo Restaurant  
14 West 4th Street  
(corner of Mercer Street)  
New York, NY

Times: Meeting 7:15 PM

Place: New York University  
Silver Center Room 207  
32 Waverly Place  
New York, NY



## COME AND JOIN US CELEBRATE EARTH WEEK

WITH OUR 7th ANNUAL “WALK THE  
BROOKLYN BRIDGE” Event

This year’s Chemists Celebrate Earth Week’s theme is: “Dive into Marine Chemistry”

**Keynote address — “Ocean chemistry is changing: effects on marine life (and you!)”**

*Speaker:* Prof. Katriina Ilves  
Department of Biology  
Pace University

We will meet at Pace University in the Bianco Room at 11:00 AM for check-in followed by welcoming remarks, our keynote address, and our celebratory “Earth Day Parade” across the iconic Brooklyn Bridge! Participants will be provided with lunch and Earth Day gifts. The event is free and open to all, but EVERYONE must register by 4/8. Past the registration deadline there will be a \$10 onsite fee at the event (cash only). To register:

<http://www.newyorkacs.org/meetings/EarthDay/CCED.php>

**Date: Sunday, April 22, 2018**

Time: 11:00 AM – 3:00 PM

Contact: Prof. JaimeLee Rizzo,  
CCED Coordinator  
[jrizzo@pace.edu](mailto:jrizzo@pace.edu)

To enter our illustrated poetry contest, see page 18.



## NEW YORK/NEW JERSEY SOCIETY FOR APPLIED SPECTROSCOPY

### FUTURE MEETINGS

“Laser-induced Breakdown Spectroscopy (LIBS) Addition to Microscopic Analyses and Raman and IR of Particles.”

*Speaker:* Dr. Markus Lankers  
Rap.ID GmbH

**Date: Wednesday, April 25, 2018**

See [www.nysas.org](http://www.nysas.org) for details.

\*\*\*\*\*

“Application of FTIR in Understanding the Changes in Protein Secondary Structure as a Result of Stress”

*Speaker:* Dr. John Wasyluk  
Bristol-Myers Squibb Company

**Date: Wednesday, May 23, 2018**

See [www.nysas.org](http://www.nysas.org) for details.



## Chemists Celebrate Earth Week (CCEW) 2018

### “Dive into Marine Chemistry” Illustrated Poem Contest

The New York City Local Section of the American Chemical Society (ACS) is sponsoring an illustrated poem contest for students in Kindergarten through 12th grade.

**Contest Deadline: April 6, 2018**

**Prizes: 1<sup>st</sup> Prize in each category receives a \$20 gift certificate  
2<sup>nd</sup> Prize in each category receives a \$10 gift certificate**

**Contact: Elmer E. Mojica, Department of Chemistry and Physical Sciences, Pace University, One Place Plaza, New York, NY 10038 (Phone: 2123461344; Email: [emojica@pace.edu](mailto:emojica@pace.edu))**

Winners of the New York City Local Section's Illustrated Poem Contest will advance to the ACS National Illustrated Poem Contest for a chance to be featured on the ACS website and to win prizes!

Write and illustrate a poem using the CCED theme, “Dive into Marine Chemistry.” Your poem must be **no more** than 40 words and in the following styles to be considered:

**HAIKU - LIMERICK - ODE - ABC POEM - FREE VERSE -  
END RHYME - BLANK VERSE**

**Possible topics related to marine chemistry include:**

Fish	Pollution	Preservation	Remediation
Antarctica	Polar Ice Caps	Algae	

**Entries will be judged based upon:**

Relevance to and incorporation of the theme  
Word choice and imagery  
Colorful artwork



#### **Contest Rules:**

- Poems must conform to a particular style. No poem may be longer than 40 words.
- The topic of the poem and the illustration must be related to the CCED 2018 theme.
- All entries must be original works without aid from others.
- Each poem must be submitted and illustrated on an unlined sheet of paper (of any type) not larger than 11" x 14". The illustration must be created by hand using crayons, water-colors, other types of paint, colored pencils, or markers. The text of the poem should be easy to read and may be printed with a computer before the hand drawn illustration is added, or the poem may be written on lined paper which is cut out and pasted onto the unlined paper with the illustration.
- Only one entry per student will be accepted.
- There will be 4 categories: Grades K-2, Grades 3-5, Grades 6-8 and Grades 9-12.
- All entries must include an entry form.
- All illustrated poems and/or digital representations of the poems become the property of the American Chemical Society.
- Acceptance of prizes constitutes consent to use winners' names, likenesses, and entries for editorial, advertising, and publicity purposes.

## WESTCHESTER CHEMICAL SOCIETY

### Distinguished Scientist Award and Student Achievement Awards Dinner Meeting: "The Control of Spin Dynamics in Solid-State Nuclear Magnetic Resonance Spectroscopy"

Speaker: Eugene Stephane Mananga, PhD  
(See biography for affiliations)



#### Abstract:

Since the first demonstration of electron paramagnetic resonance (EPR) in 1944 and the first demonstrations of nuclear magnetic resonance (NMR) in condensed matter in 1946, the field of magnetic resonance spectroscopy has generated a continuous stream of conceptual advances, methodological innovations, and new applications that continues to the present day. From the results of numerous developments, magnetic resonance is now a central technique in nearly all areas of the physical, chemical, and biological sciences. So how can qualitative breakthroughs in magnetic resonance techniques and applications continue to occur after more than 70 years? The possibility of manipulating spin evolution in an endless variety of ways, which can be accurately described by quantum mechanics and mathematics, and the ability to control the dynamics of nuclear spins have been of general interest to the NMR community since the early days of the field. A celebrated example is Hahn's demonstration of the refocusing of spin magnetization by the application of a suitable RF pulse sequence, as nuclear spins of a liquid dephase due to static field inhomogeneity. Numerous examples of improving quantum control in NMR are known within the community, such as enhanced radio frequency pulses that precisely implement a desired system evolution. This talk is centered on the dynamics of spin systems in solid-state NMR spectroscopy, which is a kind of NMR spectroscopy characterized by the presence of anisotropic interactions. The importance of solid-state nuclear magnetic resonance stands in its ability to determine accurately intermolecular distances and molecular torsion angles. Controlling the spin dynamics in solid-state NMR is mainly a theoretical problem, which consists of striving to solve the time-dependent Schrodinger equation, which is a central problem in quantum physics in general, and solid-state NMR in particular. The commonly used methods to treat theoretical problems in solid-state NMR are the average Hamiltonian theory and the Floquet theory, which have been successful for designing sophisticated pulse sequences and understanding of different experiments. The Floquet-Magnus expansion recently introduced in solid-state NMR establishes the connection between the averaged Hamiltonian theory and the Floquet theory.

#### Biography:

Dr. Mananga is a Faculty Member in the Physics Doctorate Program and in the Ph. D Program in Chemistry at the Graduate Center of the City University of New York (CUNY). He is an Assistant Professor of Physics and Nuclear Medicine at Bronx Community College of CUNY, and an Adjunct Professor of Applied Physics at New York University. His initial education was at The University of Yaounde, Yaounde, Cameroon [B.Sc. Physics (minor in Chemistry), 1990, Maitrise, Physics (Minor in Mechanics), 1991, and DEA, Physics (Minor in Mechanics), 1992]. He continued his education at the CUNY, receiving an M.A in Physics (2002), an M.Phil in Physics (2004) and completing his Ph.D in Physics from the Graduate Center of the City University of New York in 2005 under the supervision of Prof. Steven Greenbaum at Hunter College. Dr. Mananga also has additional graduate degrees and training from various institutions including Harvard University, Massachusetts General Hospital, and City College of New York. He did his postdoctoral studies in the National High Magnetic Field Laboratory of USA, Harvard Medical School, and Massachusetts General Hospital. Prior to joining Harvard he was an "Ingenieur de Recherche" in the French Atomic Energy Commission and Alternative Energies ("Commissariat a l'Energie Atomique de France", CEA-SACLAY) where he introduced the Floquet-Magnus expansion in the field of Solid-State Nuclear Magnetic Resonance. Dr. Mananga has published more than 60 peer-review scientific articles (mainly as first and corresponding author) including prestigious and major scientific journals such as Physics Reports, Royal Society of Chemistry, the Journal of Chemical Physics, the Journal of Physical Chemistry, Chemical Physics, Journal of Magnetic Resonance, etc. and has been serving as editorial board member for more than 30 international scientific journals. He currently serves as the Editor-in-Chief of the Journal of Imaging Science and also serves the most prestigious position of "Chief Editor" for the editorial board of "The Scientific Journal of Molecular Physics". He has been an honorable Scientific Adviser and Organizing Committee Member for several major international scientific conferences in the US and around the world. His scientific contribution in the field of Nuclear Magnetic Resonance was honored during the 70th anniversary (1946 - 2016) of the Russian Academic of Sciences. Professor Mananga was selected by the Academy of Humanities and Sciences as Laureate of the prestigious 2017 Henry Wasser Award in Physics for outstanding achievements at the City University of New York.

**Date:** Thursday, April 26, 2018

**Times:** Social Hour - 5:00 PM  
Lecture and Awards - 6:00 PM  
Dinner - 7:00 PM

**Place:** Pace University, Wilcox Hall  
Stephen Friedman Room  
861 Bedford Road – Entrance #1,  
Pleasantville, NY 10570

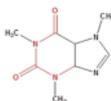
**Cost:** \$30.00; Students: \$20.00

Please RSVP to Peter Corfield, E-Mail: [pcorfield@fordham.edu](mailto:pcorfield@fordham.edu); Phone 914-762-4468 or Text 914-980-9128

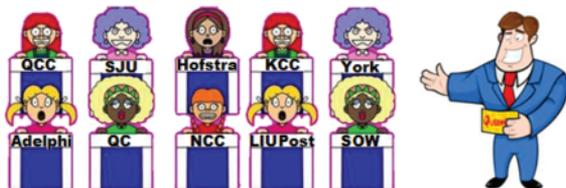


## The Long Island Subsection Of the New York American Chemical Society

*Proudly Sponsors*



## The 18<sup>th</sup> Annual Chemistry Challenge



**Come and Cheer on the local college student representatives as they match up their Chemistry knowledge against each other. Prizes will be awarded to 2yr and 4yr institution winners!**

**When:** Friday, April 27, 2018

**Where:** Queensborough Community College, Science Building Rm S-112

**Time:** 5 – 6 pm – Social with Food; 6 – ~8 pm - Chemistry Challenge

**Directions:** <http://www.qcc.cuny.edu/about/driving.html>

**Event:** The Chemistry Challenge is a quiz-style competition brought to you by the Long Island subsection of the American Chemical Society and sponsored by QCC-Student Affiliates of American Chemical Society. The event features a fun, multiple choice test covering General and Organic Chemistry topics. Students from nearby colleges work in teams and enter their answers using Clickers. Winners will be announced for 4yr and 2yr Colleges and prizes will be awarded at the conclusion of the event.

**All Are Welcome**



American Chemical Society Long Island Subsection  
[http://www.newyorkacs.org/sub\\_island.php](http://www.newyorkacs.org/sub_island.php)



ACS  
Chemistry for Life®

66<sup>th</sup>

ANNUAL UNDERGRADUATE  
RESEARCH SYMPOSIUM

**The New York Chemistry Students' Association  
Student Affiliate Committee – New York Section  
American Chemical Society**

**Saturday, May 5<sup>th</sup>, 2018 at York College CUNY**

**8:00 am – 3:00 pm (breakfast, luncheon and award reception included)**

**Sign up as an attendee at <http://www.newyorkacs.org/meetings/urs/urs.php>**

**Keynote Speaker**

**Dr. Dhabih V. Chulhai**

Dept. of Chemistry, University of Minnesota, Minneapolis MN

Dhabih Chulhai grew up in Guyana and began his studies in chemistry at the University of Guyana. He received his B.S. in Chemistry at York College of the City University of New York (CUNY) in 2011, where he worked with Prof. Ruel Desamero, and his Ph.D. in Chemistry from The Pennsylvania State University in 2016, working with Prof. Lasse Jensen. Since then, he has been working as a postdoctoral associate with Dr. Jason Goodpaster at the University of Minnesota. Dr. Chulhai was awarded the Eugene and Jane Apple Science Graduate Fellowship at Penn State University for his contributions to the National Science Foundation's (NSF), Center for Chemical Innovation (CCI) entitled Center for Chemistry at the Space-Time Limit (CaSTL). In CaSTL he worked with a team to develop and use theoretical methods to understand chemistry at the smallest possible length and time scales. He is currently a part of the Department of Energy's Nanoporous Materials Genome Center, where his research is focused on developing and using highly accurate quantum chemical methods to guide the discovery of novel materials.



**Keynote Address**

**Understanding Chemistry Using Theoretical Embedding Methods**

**Abstract:** All of chemistry may be understood by solving the time-dependent Schrödinger equation for the relevant system, although exact solutions are often impossible or computationally too expensive. Theoretical and computational chemists seek to find and use shortcuts that are both accurate and computationally tractable to solve this equation. Luckily, most of chemistry often occurs in a small region of an otherwise complex environment. As such, we are interested in using embedding methods—where we use a highly accurate method to describe the small region of interest but describe the rest of the environment using less accurate methods—to model systems. Experiments are now able to observe chemistry happening one molecule at a time, using techniques like surface-enhanced and tip-enhanced Raman scattering. We will show how using these embedding methods allows us to gain insights into these experimental findings.

**SEEKING FACULTY MENTORS, GRADUATE STUDENTS,  
OR POST DOCS AS SESSION CHAIRPERSONS!  
SEEKING STUDENTS AS MODERATORS!**

2018 Co-chair  
**Dr. Paul Sideris**  
Queensborough Community  
College [psideris@qcc.cuny.edu](mailto:psideris@qcc.cuny.edu)

2018 Co-chair  
**Dr. Yolanda Small**  
York College - CUNY  
[ysmall@york.cuny.edu](mailto:ysmall@york.cuny.edu)

2018 Co-chair  
**Dr. Ipsita A. Banerjee**  
Fordham University  
[banerjee@fordham.edu](mailto:banerjee@fordham.edu)

2018 Co-chair  
**Dr. Naphtali O'Connor**  
Lehman College - CUNY  
[naphtali.oconnor@lehman.cuny.edu](mailto:naphtali.oconnor@lehman.cuny.edu)

FREE Registration for student members of the National ACS, faculty members who register in advance and sponsors. For non-ACS members and guests, the registration is \$35 in advance. All on-site registration is \$45 for faculty, staff and guests. Checks for the registration fee should be made out to "NY ACS URS" and sent to: Prof. Joseph Searin, St. John's University, Department of Chemistry, 333 St. Albert Hall, Queens, NY 11439.

**SEE CALL FOR PAPERS ON PAGE 27**

## **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](mailto:hessytaft@hotmail.com).

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



## **CHEMICAL MARKETING & ECONOMICS GROUP**

**Mark your Calendars:**

**Dates: Tuesday, June 19, 2018**

Times: Refreshments — 7:00 PM

Science — 7:30 PM

Place: New York University

Dept. of Chemistry, Room 1003

(10th Floor) Silver Center

31 Washington Place (between

Washington Sq. East & Green St.)

New York, NY



## **CANDIDATES FOR THE NEW YORK SECTION 2018 ELECTIONS**

At the January 2018 Section-wide Conference, the Nominating Committee presented the candidates for office for the 2018 elections. The biographies of the candidates will be posted on the New York Section website at [www.NewYorkACS.org](http://www.NewYorkACS.org).

Electronic ballots will be sent to the membership in mid-April and voting will be conducted according to ACS guidelines for confidentiality and security. If your e-mail address has changed, please update it on the ACS website. If no e-mail address is associated with your membership number, a

paper ballot will be sent to you automatically. Members that do have an e-mail address associated with their membership number will be asked in a survey if they want a paper ballot.

To receive all electronic messages from the New York Section, please be sure that your e-mail account will accept messages from [NYACS-L@stjohns.edu](mailto:NYACS-L@stjohns.edu), [njesper1@optonline.net](mailto:njesper1@optonline.net) or [jespersn@stjohns.edu](mailto:jespersn@stjohns.edu). **For New York Section elections, your e-mail account needs to receive messages from Survey Monkey.**

Members requesting paper ballots will receive them by **May 1, 2018**. If any member does not receive voting materials by May 1, please contact the New York Section Office at (516) 883-7510 or [njesper1@optonline.net](mailto:njesper1@optonline.net).

The Board of Directors extends a sincere thank you to the following candidates for accepting the nomination to run for office, and encourages ACS New York Section members to vote for these very worthy candidates.

The Candidates are:

### **Chair-Elect for 2019**

Ruben Savizky (The Cooper Union)

Yufeng Wei (New Jersey City University)

### **Secretary for 2019 and 2020**

Daniel Amarante (College of Mount Saint Vincent)

Richard Rosso (St. John's University)

### **Director-at-Large for 2019**

Ivan Dempsey Hyatt (Adelphi University)

Aaron Muth (St. John's University)

Daniel Silverio (Adelphi University)

Sabesan Yoganathan (St. John's University)

Joseph Wiener (Pepsico Global R&D)

Yosra Badiei (St. Peter's University)

### **Councilor for 2019 - 2021**

Donald Clarke (Fordham University)

Ronald D'Amelia (Hofstra University)

Brian Gibney (Brooklyn College – CUNY)

Hiroko Karan (Medgar Evers College – CUNY)

Pamela Kerrigan (College of Mount Saint Vincent)

JaimeLee Rizzo (Pace University)

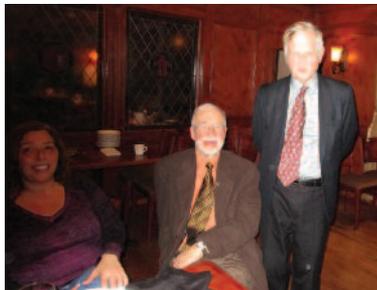
Justyna Widera-Kalinowska (Adelphi University)

**2018 STEM Family Night at Great Neck Baker School**  
Educating the Next Generation of the Leaders about the Importance of  
Taking Care of Our Environments via Greener STEM Efforts  
U.S. Merchant Marine Academy Science Club, LIACS, January 31, 2018



## WESTCHESTER CHEMICAL SOCIETY

On February 15, 2018 the Westchester Chemical Society (WCS) hosted a Science Café at the Briars Restaurant in Briarcliff Manor NY. Dr. G. David Mendenhall spoke, and led a lively discussion, on Climate Change. Dr. Mendenhall's main argument was that the global increase in CO<sub>2</sub> concentrations can be offset by concerted efforts to sequester carbonaceous materials in amounts equivalent those burned as fossil fuels. Such an approach, which may not require new technology or punitive taxes, is generally ignored by articles on global warming. Dr. Mendenhall founded (in 1999, after retiring from Michigan Technological University), and is president of, Eastern Sources, Inc., which specializes in custom syntheses and consulting. His B.S. is from the University of Michigan and his Ph.D. is from Harvard University. He did a post-doc with S. W. Benson, at Stanford Research Laboratories and has also worked at Battelle Laboratories. Several photos from the Café follow.



Jennifer Wagner, Peter Corfield and G. David Mendenhall



Peter Corfield, Rolande Hodel, G. David Mendenhall and Joan Laredo-Liddell  
(Note: all but Dr. Mendenhall are Members of the WCS Board of Directors)

*(All photos courtesy of Rolande Hodel)*



Gillian Corfield, Sarah Corfield, Paul Dent, Jennifer Wagner and Peter Corfield



Participants at the Science Café



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# 2018 Middle Atlantic Regional Meeting

NanoMARM Small Meeting - Big Results  
A One Day Meeting for the Mid-Atlantic Region

**June 3, 2018**

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## Meeting Highlights

### Poster Sessions

12:00-2:00 PM & 2:00-4:00

Chemagination 12:00-4:30 PM

### Oral Sessions

12:00-2:00 PM & 2:00-4:00 PM

**Plenary Speaker** 4:00 PM

**Awards Dinner** 5:00-7:30 PM

### Plenary Speaker:

**Dr Jenny Rampling**

*Assistant Professor  
History of Science  
Program*

*Princeton University*

on

*“George Ripley (c.1414-  
1490) and the Image of  
English Alchemy”*

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MARM Awards

Chemagination

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Contact: [nanomarm2018@gmail.com](mailto:nanomarm2018@gmail.com)

Website: [www.marmacs.org/2018](http://www.marmacs.org/2018)

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## Call for Nominations

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### 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](http://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](mailto:jespersn@stjohns.edu).



### NOJ AWARD FOR CREATIVITY IN MOLECULAR DESIGN AND SYNTHESIS

The ACS North Jersey Section is soliciting nominations for the 2018 Award for Creativity in Molecular Design & Synthesis. The award recognizes initiative, creativity, leadership, and perseverance in pure and/or applied chemistry. Nominees must have had broad impact in the areas of chemical synthesis, method development, bioorganic/medicinal chemistry, pharmaceutical sciences, and/or molecular recognition.

Nominations should include a letter describing the nominee's achievements, a brief biography and curriculum vitae, and a list of the nominee's important published works. Supporting letters are strongly encouraged.

Please submit materials by **March 23** to Susan Zultanski at [Susan.Zultanski@merck.com](mailto:Susan.Zultanski@merck.com). The award is presented by the section every two years, and the prize consists of a crystal plaque and a \$5,000 honorarium.

### WILLIAM H. NICHOLS MEDAL AWARD FOR 2019

The New York Section is accepting nominations for the William H. Nichols Medal Award for the year 2019. This distinguished award, established in 1902 by Dr. William H. Nichols, for the purpose of encouraging original research in chemistry, is the first award authorized by the American Chemical Society. The award is presented annually in recognition of an outstanding contribution in the field of chemistry, and consists of a gold medal and a bronze replica. In March or April, the medals are awarded during the William H. Nichols Meeting that features the Distinguished Symposium related to the medalist's field of expertise and the Medal Award Dinner.

Investigators who have published a significant and original contribution in any field of chemistry during the five calendar years preceding the presentation meeting are eligible for consideration by the Nichols Medal Jury. The New York Section encourages nominations from academia, government and industry.

Each nomination requires a completed nomination form, biographical and professional data, and seconding letters. Since the nomination process utilizes the New York Section website, please access the nomination form and instructions at [www.newyorkacs.org/meetings/Nominations/Nichols.php](http://www.newyorkacs.org/meetings/Nominations/Nichols.php).

Nominations must be received by **May 31, 2018**. The Nichols Medal Award Jury will meet in June 2018 to select the William H. Nichols Medalist for 2019.

Questions regarding the nomination procedure should be directed to the ACS, New York Section Office, at [njesper1@optonline.net](mailto:njesper1@optonline.net).



# Call for Papers



**ACS**  
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**66<sup>th</sup>**

**ANNUAL UNDERGRADUATE  
RESEARCH SYMPOSIUM**

**Call for Papers** for the 66<sup>th</sup> ANNUAL UNDERGRADUATE RESEARCH SYMPOSIUM sponsored by the Student Activities Committee of the New York Section of the American Chemical Society. The symposium provides an excellent opportunity for undergraduate chemistry students in the NY metropolitan area to present the results of their research. The program includes a keynote address by Dr. Dhabih Chulhai, Department of Chemistry, University of Minnesota, presentation of student papers, followed by a luncheon. Abstracts of original research in chemistry will be accepted.

**Date: Saturday, May 5<sup>th</sup>, 2018**

**Place: York College, The City University of New York, Queens, NY**

To:

1. Submit an abstract on-line (Please strictly follow the abstract template format)
2. Print a flyer for posting - Click "Download Flyer" in the blue frame
3. Obtain directions to York College CUNY

Go To: <http://www.newyorkacs.org/meetings/urs/urs.php>

## SIGNIFICANT DATES FOR 66<sup>th</sup> URS

Abstract submission and online registration opens - February 1, 2018

Deadline for abstract submission - March 15, 2018

Notification of the abstract acceptance - March 26, 2018

Deadline for early registration - April 15, 2018

FREE Registration for student members of the National ACS, faculty mentors who register in advance and sponsors. For non-ACS members and guests, the registration is \$35 in advance. All on-site registration is \$45 for faculty, staff and guests. Students can obtain a discounted 1-yr membership to the ACS for \$25 by visiting <http://undergrad.acs.org/>

Checks for the registration fee should be made out to: "NY ACS" and sent to:  
Prof. Paul Sideris, Queensborough Community College, Science Building S-445, 222-05  
56<sup>th</sup> Avenue, Bayside, NY 11364

If you have any questions, please contact: [nyacsurs2018@gmail.com](mailto:nyacsurs2018@gmail.com)

2018 Co-chair  
**Dr. Paul Sideris**  
Queensborough Community  
College [psideris@qcc.cuny.edu](mailto:psideris@qcc.cuny.edu)

2018 Co-chair  
**Dr. Yolanda Small**  
York College - CUNY  
[ysmail@york.cuny.edu](mailto:ysmail@york.cuny.edu)

2018 Co-chair  
**Dr. Ipsita A. Banerjee**  
Fordham University  
[banerjee@fordham.edu](mailto:banerjee@fordham.edu)

2018 Co-chair  
**Dr. Naphtali O'Connor**  
Lehman College - CUNY  
[naptali.oconnor@lehman.cuny.edu](mailto:naptali.oconnor@lehman.cuny.edu)

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## Call for Volunteers

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### **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 CO<sub>2</sub> 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](http://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](mailto: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!

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## Call for Applications

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### **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](http://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](mailto: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](mailto: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](mailto:goodeyn@mail.montclair.edu)).



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## Call for Abstracts

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### **NORTH JERSEY SECTION'S 70th ANNUAL UNDERGRADU- ATE RESEARCH CONFERENCE**

The Seventieth Annual Undergraduate Research Conference provides an opportunity for talented undergraduate students in the North Jersey Section to give an oral presentation on their research results. All undergraduate students in the North Jersey Section are invited to participate in this very rewarding event. The research presentations will be judged by local chemists working in industry or academia and the student giving the best presentation will be given the 2018 Jean Asell Duranna Award. In addition the top three presenters will be awarded cash prizes. The student award winners and their advisors will then be invited to attend the North Jersey Section's Annual Awards Dinner held on the Fairleigh Dickinson University campus in Madison, NJ.

**Abstract Information:** Clearly indicate the title of the presentation and all authors. Abstracts must be no more than 200 words and need to be submitted as a word document attached to an email to Matthew Mongelli at [mmongelli@kean.edu](mailto:mmongelli@kean.edu)

Abstracts deadline is **Wednesday April 11, 2018.**

**Date:** Friday, April 27, 2018  
**Times:** 11:30AM until 4:30 pm  
**Place:** New Jersey Institute of Technology  
 Campus Center Ballroom A  
 Newark, NJ 07102

For more information about this event contact Matthew Mongelli at [mmongelli@kean.edu](mailto:mmongelli@kean.edu)

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## In the News

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### **UN-MIXING USING LASERS TO MAKE NEW CRYSTALS**

Scientists have managed to separate two liquids in a mixture using a laser, which they claim will lead to new ways of manipulating matter and creating crystals for industry.

In a paper published today (5 March 2018) in the journal *Nature Chemistry*, researchers from the University of Glasgow present a

novel approach to separate and create new phases using a simple laser. The faithful production of crystals is critically important in science and technology as crystals are used in computers, phones, drugs, paints, light bulbs, solar cells, etc.

However, producing the right type of crystal is critical. We currently lack the ability to fully control the crystallisation process and this can lead to extremely costly problems in industry.

In the new approach, a laser is used to harness fluctuations associated with a so-called critical point and to drive the system towards a phase separated state. This was demonstrated using a simple liquid mixture.

This research is funded by a grant from the Engineering and Physical Sciences Research Council (EPSRC).

The paper titled "Control over phase separation and nucleation using a laser-tweezing potential" is published in *Nature Chemistry*. Videos of the process are available at <http://www.chem.gla.ac.uk/wynne/research/2018-tweezing.html>.



### **SWISS OFFER BETTER SOLUTION TO LOWER HAI'S (Hospital Associated Infections) AND TO ADDRESS THE FLU EPIDEMIC**

(Cape Coral, Florida) Bio-Sanitize USA is bringing a radically new, highly effective bio-sanitizing device to market in the U.S. The eco-friendly, preventive airborne sanitizer is a product of Saniswiss™, a Geneva based international company focused on health and medical disinfectant challenges.

Addressing the worldwide healthcare crisis resulting from nosocomial (hospital-borne) pathogens and antibiotic-resistant bacteria, the "Saniswiss Automate aHP" is designed to use boosted hydrogen peroxide in a scalable mechanically aerosolized application to disinfect virtually all surfaces in places where these bacteria exist and persist.

This application method can replace the ineffective infection control efforts in hospitals (which costs between \$30-40 Billion every year), nursing homes, ambulances, physician offices, daycare centers, schools, cruise ships, public transportation and any area where many people are likely to pass through (and pass along germs) during a day.

Bio-Sanitize USA (BSU) CEO Tayfun

“Sonny” Taylor, says, “Current methods of sanitizing these places are inherently incomplete, time consuming, not scalable and expensive, and also toxic cause of the usage of silver-ions (ag) , Volatile Organic Compounds (VOCs) or Formaldehyde (CH<sub>2</sub>O)”

BSU is introducing their device to the U.S. market with a strong European endorsement. EU standards have rated the product effective in bactericide activity (such as staphylococcus aureus, MRSA, aspergillus niger, pseudomonas aeruginosa, e coli, enterococcus hirae), virus activity (such as norovirus and adenovirus) yeasticide/fungicide activity (such as candida albican) and spore activity (such as bacillus subtilis and c-diff). This product has been in use for some time in many European, Asian and Arabic countries, and has recently started in Canada.

The method of application for Biosanitizer a-HP is through a device similar in size to a canister vacuum cleaner. Mr. Taylor says, “The device is wheeled into a room or vehicle and a bottle of solution (H<sub>2</sub>O<sub>2</sub> boosted) is inserted. Simply push the start button and the solution is dispersed into the space in an aerosolized state, covering virtually every surface – floor to ceiling and in between.”

The application takes approximately 5 minutes. The device is then removed from the room and the door closed for 30 minutes processing time. The Biosanitizer aHP can immediately be moved to another space and started again for optimum use of the device.

Hospital associated infections (HAIs) result in an estimated 100,000 deaths a year; cost healthcare providers \$35 billion to 45 billion annually; and create immeasurable suffering. To more personally explain the crisis in spreading infections, all major news outlets have reported this week that 2018 has already seen one of the worst influenza “epidemics” in US history with nearly every state reporting growing numbers of cases. The elderly and the young are the prime targets. Forty infants in the U.S. have succumbed to flu thus far, a tragic loss of life.

It is imperative that every effort be made to thwart the persistence of these “super bugs” and protect citizens everywhere – at home, at play and most especially in medical settings.

Detailed information about this exciting new technology is available from <http://www.saniswiss.com> and [www.biosanitize.us](http://www.biosanitize.us).

Mr. Sonny Taylor can be reached at 800-835-0820.



## TOXINS RETURN IN ELECTRONICS AND ELECTRICS: ESCAPE ROUTES

There is a flood of new electronic and electrical devices reintroducing toxins very similar to those in tobacco smoke, diesel fumes, asbestos and other killers. Some of these devices will sell in up to billions yearly but there has been no tracking of the big picture of imminent toxic threat from the balance of virulence, morphology and likely prevalence of these toxins. Something only moderately toxic is a threat if it is widely deployed in millions yearly and has uncontrolled disposal. Small particles are more reactive and penetrating and researchers suspect that some can magnify the toxicity of others: small volume, big danger? Uniquely, the new IDTechEx report, “Toxic Materials and Alternatives in Electronics/ Electrics 2018-2028” looks at all of this.

This report has a timeline of planned introduction of “toxins of concern” into electronics and electrics 2018-2028 and analyses those deployed today and those being researched in new devices.

Time to pay attention. This report reveals alternatives and research leading to alternatives that are receiving insufficient attention and funding. It recommends dates for banning certain materials based on its analysis and a close watch on others but in a measured way taking into account the risks and needs of all in the value chain – manufacture, use, abuse and disposal. For example, the report proposes when two carcinogenic device chemistries should be banned given that alternatives are commercially successful. It argues that the threat will continue for 30 years without action. These materials are variously associated with birth defects, lethal HCN when burnt or ingested or cumulative multiple pathologies in humans.

“Toxic Materials and Alternatives in Electronics/ Electrics 2018-2028” has dense summaries and infograms revealing the breadth of adoption and planned adoption of physically and chemically toxic materials. The Executive Summary and Conclusions is comprehensive and sufficient in itself, identifying large sales and serious toxicity issues now and in future. See why toxicity measurements are suspect. 38 elements and compounds are tabled with LD50 toxicity, pathologies and devices where they are used or will be used and comments received from suppliers.

See more at [www.IDTechEx.com/toxin](http://www.IDTechEx.com/toxin).

## Professional/Product Directory



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There are many companies and organizations searching for chemical and biochemical personnel to fill important jobs in their organizations.

- Companies for laboratory and management positions
- Universities & Colleges for teaching positions and laboratory personnel
- Hospitals for technical and research personnel

There are several web sites that may help you search for these open positions.

- [www.mboservices.net](http://www.mboservices.net)
- <http://newyorkacs.org/jobs.html>
- <http://njacs.org/jobs.html>

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## Ad Index

### ANALYTICAL

Micron Inc. . . . .5

Robertson Microlit Labs . . . . .8

### EQUIPMENT

Eastern Scientific Co. . . . .32

### GENERAL

ACS-NY/NoJ Sections . . . . .16

ACS-NY/NoJ Sections . . . . .32

ACS-NY/NoJ Sections . . . . .32

ACS-NY/NoJ Sections . . . . .32