



# CHE NEWSLETTER

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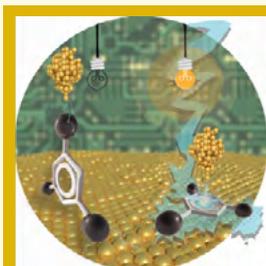
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## CHE COMMUNICATION LISTSERV SIGN-UP

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This work was published in *Angewandte Chemie* (<https://doi.org/10.1002/anie.201903898>, CHE-1508567).

## CHE FUNDED RESEARCH HIGHLIGHT

Making single molecule electronic components, like rectifiers or switches, is an ultimate goal for fabricating electronics in the nano realm. Traditionally, single molecule junctions are fabricated by anchoring the molecule between two metal electrodes and charge transport is measured only along a single axis. When studying the charge conduction through benzene

derivatives, **Eric Borguet's group at Temple University** discovered that the geometry of a molecule between the electrodes has a significant impact on the charge transport through that molecule. Harnessing that anisotropic effect in trimesic acid, Borguet's group developed a single-molecule electromechanical switch. Using an applied voltage at the electrode, they controlled the geometry of the molecule and found that a planar orientation gave rise to a conductance that is more than 400 times higher than that of an upright molecule.

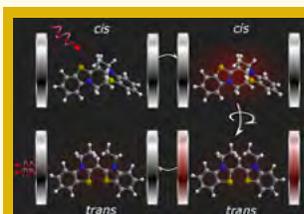


Figure from J.B. Pérez-Sánchez and J. Yuen-Zhou, *J. Phys. Chem. Lett.* 11, 1, 152 (2020).

## POLARITON CHEMISTRY: EXPLOITING CONFINED LIGHT FOR CHEMICAL CHANGE

Light has long been recognized as a ubiquitous agent of chemical change

throughout human civilization. In particular, the central role of light in modern Physical Chemistry cannot be overstated: ultrafast pulses are routinely deployed to induce and track the formation and breaking of bonds in the natural timescales of molecules. Just like the advent of flash-lamps and lasers launched a new era in Chemistry, so should advances in quantum optics and photonics. Following this vision, the theoretical chemistry group led by **Joel Yuen-Zhou at the University of California San Diego (UCSD)** has developed a vibrant NSF-funded research program (CAREER CHE-1654732 and EAGER CHE-1836599) in-line with the NSF Quantum Leap Big Idea. In one of his recent work, he showed the photoisomerization of a single molecule strongly coupled to an optical cavity can lead to generation of photon pairs, providing a molecular version of the dynamical Casimir effect.



## UPDATE FROM THE DIVISION DIRECTOR

Dear Chemistry Colleagues,

It is a real honor to have been selected to serve as the current Division Director for NSF Chemistry (CHE), stepping into this role May 26, 2020. I would like to begin by thanking Carol Bessel, who has magnificently led NSF-CHE for a significant period as Acting Division Director, and who has done so with great skill and exceptional diligence. I very much look forward to working closely with Carol as Deputy Division Director, as we partner to lead the fine team of over two dozen administrative and technical staff that comprise the Chemistry Division. I also want to thank both Lin He and Anne-Marie Schmoltner for ably stepping forward to serve in the Acting Deputy Division Director role over this period.

Just a couple of comments about my background; I come into this position as an IPA, as Willa Cather Professor of Chemistry at the University of Nebraska, where I and my research group pursue questions at the interface of stereocontrolled organic synthesis and chemical biology, with a particular interest in mechanistic enzymology. I have served as Chair of my Department of Chemistry and in our Office of Research & Economic Development to facilitate interdisciplinary research across departments and campuses. Ten years ago, I ventured to the NSF for a stint as a rotating Program Officer (PO) myself, encouraged by the PO who was managing my grant at the time. What I experienced 'on the other side' convinced more than I could have known of the NSF Chemistry Division's commitment to promoting basic science research, broader impacts and the meaningful broadening of participation in our discipline. It is a real privilege to re-join the NSF Chemistry team and continue to build the NSF-CHE portfolio with them while holding to these core tenets.

As I write to you, we face a serious challenge, and one that reminds us of the importance of science and basic research for the national welfare and, indeed, for the well-being of humankind. The current COVID-19 pandemic demands innovation and adaptability from all of us, requiring us to double-down and diligently and carefully work to meet this challenge and better position ourselves to meet future challenges that Darwinian selection will almost certainly bring to the fore. NSF-CHE has responded to this challenge, by continuing to fund the most meritorious individual investigator awards and center proposals while stepping up to swiftly support a good number of RAPID proposals that seek to leverage the best methods and the brightest students to tackle fundamental questions related to detecting, understanding, monitoring and redirecting biological systems such as those embodied in the SARS-CoV-2 viral capsid. Thanks to many members of the Chemistry community for coming forward with new ideas that bear directly on this scientific challenge and taking on these targeted endeavors now in addition to your mainline programmatic activities.

It is truly a testament to the dedication and nimbleness of the scientific and administrative staff at NSF-CHE that the transition to a completely remote workplace has transpired swiftly and with nary a snag. As I onboard virtually myself and videoconference with my new colleagues, I cannot say enough about the adaptability of the CHE-team – NSF CHE has not skipped a beat and grant proposals are being carefully evaluated and processed as expeditiously as under normal circumstances despite the hurdles.

As we look forward to FY 2021, we see great opportunities for Chemistry to contribute to scientific advances that streamline and innovate in the chemistry that underlies industries of the future. We expect that advances in chemistry will contribute directly to advances in manufacturing, with an eye toward a more sustainable manufacturing environment including recycling and upcycling of the polymers that we design, and we expect that artificial intelligence tools will continue to be harnessed to greater effect in guiding chemistry and chemical biotechnology. We at NSF Chemistry look forward to interfacing with all of you as a community as we work together to launch and support the most promising research efforts, to train a versatile workforce for the future and to leverage diversity to enhance our pedagogical and research endeavors.

Regards,

**David Berkowitz**

Division Director

## CHEMISTRY STAFFING NEWS AND RECRUITING

SPECIAL THANK-YOU TO  
CAROL BESSEL

Colleagues,

As the National Science Foundation welcomes Dr. David Berkowitz as the new Division Director for the Division of Chemistry, I would like to recognize the service and accomplishments of Dr. Carol Bessel, the previous Acting Division Director.

The Directorate for Mathematical and Physical Sciences (MPS) thanks Dr. Carol Bessel for her diligent work on behalf of the chemistry research community and her untiring support for the Division of Chemistry staff and her NSF colleagues. Carol has managed the division with much skill and poise through a government shutdown, onboarding of new Directorate leadership, and the latest crisis of the coronavirus pandemic. We are truly grateful for her leadership.

It has been a pleasure working with Carol in this capacity. I look forward to continuing our collaboration in advancing the mission of the Chemistry Division as she returns to her duties as the division's Deputy Division Director, the position she has officially held since 2015. Carol first joined NSF as a Program Director in 2005. She holds a B.S. in Chemistry and a Ph.D. in Inorganic Chemistry from the State University of New York at Buffalo.

Thank you, Carol, for all that you do for your colleagues and the chemistry community at large.

Sincerely,

Sean

Dr. Sean L. Jones  
MPS Assistant Director  
Directorate for Mathematical and Physical Sciences  
National Science Foundation

[www.nsf.gov/mps](http://www.nsf.gov/mps)

CONGRATULATIONS TO  
CHE'S NEWEST PERMANENT STAFF MEMBER!

Ms. Valerie Maizel initially joined the division on a detail. She is now officially onboard permanently as a Program Specialist. She was previously from the Directorate for Biological Sciences and the Division of Molecular and Cellular Biosciences (BIO/MCB). We are looking forward to her contributions to the Chemistry team. Congratulations on your new position and promotion, Valerie!



CONGRATULATIONS TO  
DR. EVELYN GOLDFIELD FOR RETIRING!

## EVELYN GOLDFIELD

### A CURIOSITY-DRIVEN PATH TO CHEMISTRY AND TO THE HELM @ CTMC

- by David Berkowitz

To many in the Chemistry community, the Chemical Theory, Models and Computational Methods (CTMC) Program in the Division of Chemistry (CHE) is synonymous with Dr. Evelyn Goldfield. To us, at NSF, Evi is passionate about science, motivated by the power of computational chemistry, and hugely instrumental in the development of theoretical chemistry tools and in facilitating their accessibility to scientists across the cornucopia of disciplines. Evi is also passionate about empowering the next generation of scientists and about developing mechanisms and outreach activities to reach and motivate early career scientists. As Evi prepares to pass the baton on the leadership of the marquee CTMC program, I had occasion to sit down with her across a Zoom screen as she reflected on her path to chemistry, to theoretical and computational chemistry, as a specialization, and to NSF as Program Lead of CTMC.

It all goes back to Bexley, Ohio, a town fully engulfed by Columbus, in the heart of the United States--on the eastern edge of the Midwest, where the elevation is still flat. Evi took a circuitous path, recalling that in grade school she was not particularly fond of arithmetic, but that, much to the surprise of her classmates, an early elementary math teacher remarked that, presumably based on the sort of questions young Evelyn was asking, she looked like a potential mathematician in the making. She remembers being motivated by her teachers in high school and, to this day, their engagement in the classroom remains with Evi as she reflects back on what moments sparked her interest in STEM. Mr. Smith was an inspiring high school chemistry teacher, and also in true mid-Americana fashion, doubled as the football coach! And Mr. Schatz was the math teacher--also outstanding.

Graduating with interest in mathematics and good early exposure to chemistry, off went a young Evelyn Goldfield to Ohio University, where she majored in math; upping the ante with a transfer to the University of Chicago where she found herself as one of only two women pursuing a BS in mathematics. The going was tough -- women were not encouraged to pursue hard core math. Evi had to earn money to attend the U of C and so worked half-time with high energy physicists, looking over microfilms from the spark chamber. She wrote a Fortran program to do some calculations she had been assigned, giving her early insight into the power of partnering computation with experiment. She then went to work at the Fermi Institute on a computer called Maniac II. Fascinated by argumentation with rigor, Evi returned to the classroom; deciding to study logic and obtained an MA in philosophy from the University of Chicago.

At this juncture, Evi took a break from academic pursuits to have children--three wonderful children--that led her to read about nutrition, and piqued her interest in physiology and development, then genetics and biochemistry. As she began drilling down deeper into the biochemistry, Evi soon remembered that she had really liked chemistry, and flashed back to Coach Smith's HS chemistry class. Evi decided to take a deep dive into chemistry, beginning with undergraduate coursework in organic and physical chemistry and leading to a PhD in chemistry under the joint tutelage of David Gorenstein (NMR studies of tRNA), Eric Gislason (dynamics) & Nora Sabelli (electronic structure/Argonne) at the University of Illinois-Chicago. This period was really a golden period of physical chemistry for Evi, where she has particularly fond memories of the study group in the P-Chem Division at UIC in which Bob Gordon and other faculty members actively participated.

A dual career pathway took Evi and her husband, Mike, on an interesting run, as is so common in academia. For Evi, that meant a postdoc at Harvard U/Smithsonian Institute with Kate Kirby, followed by a stint at the Cornell Supercomputing Center where she became a manager. When she was first at Cornell, she was a research associate in the Greg Ezra group and also collaborated with Paul Houston and John Weisenfeld. Evi also had particularly meaningful interactions with Cyrus Umrigar, who taught her about Quantum Monte Carlo and opened her eyes to the world of electronic structure as practiced in physics. While at Cornell, she also began collaborating with Stephen Gray of Argonne National Lab, on the quantum dynamics of chemical reactions. Following a special year at Argonne National Laboratory as a Maria Gephardt Meyer Fellow, Evi took on an independent adjunct faculty position at Wayne State University.

Evi's academic path, one that included mathematics, logic, bioanalytical chemistry and, of course, computational chemistry and dynamics, fit in well with the sort of multidisciplinary science that NSF often champions. Quite organically, Evi became part of an IGERT grant team at WSU. She also taught a range of chemistry from introductory General Chemistry to a popular, practical course in computational chemistry – serving actively on the WSU faculty from 1994-2008. She had a particularly fruitful interaction with her postdoc Anthony Meijer, who is now a professor at the University of Sheffield. Then, 'within hours' of formally retiring in 2008, Evi realized how great it would be to work at the NSF. This too, happened quite organically. Evi had been supported as a faculty member by NSF grants and had really come to enjoy serving on the in person NSF panels, and loved the interaction with engaged scientists and program directors, especially the panel dinners! The timing was fortuitous - Raima Larter was the head of TCC, a program about to morph into CTMC; Raima was eager to go to explore new avenues – and the rest is history.

At NSF, Evi naturally took the helm at CTMC, training several generations of rotators, always carrying the torch for computational and theoretical chemistry and facilitating accessibility to computational tools for scientists across a wide array of disciplines. At the Foundation, Evi quickly became known as a bridge-builder across Divisions and Directorates, fostering scientific and co-funding partnerships, particularly with DMS, DMR, PHY in MPS, MCB in BIO and with CISE. She was one of the foundational PDs behind the Computational and Data-Enabled Science and Engineering (CDS&E) metaprogram that continues to support the development and use of computational methods and data mining to enable scientific discovery. She helped shape the Software Infrastructure for Sustained Innovation (SI<sup>2</sup>) program and later the Cyberinfrastructure for Sustained Scientific Innovation (CSSI) program led by Office of Advanced Cyberinfrastructure (OAC) – with big successes for the community at large. In fact, CHE has played a leading role in SI<sup>2</sup>, with the first funded Frameworks award and one of the two original Software Institutes, the Molecular Sciences Software Institute (MolSSI).

Most recently, with the advent of Quantum Leap (QL) as one of the NSF Ten Big Ideas and more recently Quantum Information Systems (QIS), as an Industry of the Future, Evi has been on the front lines. She has been a member of the Quantum Leap Working group since its inception and worked on the RAISE-TAQS, QII-TAQS and the Quantum Leap Challenge Institute Management team. She has spurred the CHE Community on to play a key role in innovation. For example, she and Daryl Hess spearheaded the **QL workshop on Quantum Algorithm in Chemistry and Materials**, followed by a DCL that involved four divisions in MPS and two in CISE and supported 24 exciting research projects this fiscal year (2020).

Through it all, drawing on of her own experience of an interdisciplinary, yet, at times challenging path, a path characterized by curiosity-driven learning and research, by persistence, and, yes, by insistence on work/life balance, Evi has been a great role model and mentor! She has taken under her wing many an early career scientist and with a 'tell it like it is' ability to communicate with women and those traditionally underrepresented in STEM, Evi has nurtured and encouraged many a PI, finding real satisfaction in seeing them hit their strides. Within the CHE Division at NSF, Evi has been a great colleague, enamored by many, for her passion for science, her wit, her candor, and her unabashed display of humanity. On the personal side, Evi is a creative spirit who loves dancing, growing orchids, making jewelry, doing yoga, and having a good walk. It has been an honor and a pleasure for us in CHE to serve with Evi in the mission of funding foundational and impactful science and in working to foster the growth and training of the next generation of scientists. Through her good work and her leadership, Evelyn Goldfield has made a lasting impact on NSF-CHE and on the CHE Community.

### A virtual symposium honoring Evelyn 'Evi' Goldfield

A virtual symposium was held on September 16, 2020, to celebrate the career of Evi Goldfield. In the words of one attendee, it was a "smashing success." It began with opening remarks by NSF COO Fleming Crim, AD for MPS, Sean Jones, and DD for CHE, David Berkowitz, as well as Nobel Laureate Rudy Marcus. This was followed by seven scientific talks reflecting the breadth of the CTMC program. The talks by Joel Yuen-Zhou (UC-San Diego), Kathy Hunt (Michigan State), Ben Levine (Stonybrook), Alán Aspuru-Guzik (Toronto), Nancy Makri (Illinois-Urbana-Champaign), Hua Guo (New Mexico), and Rigoberto Hernandez (Johns Hopkins), ranged in topic areas from quantum optics, quantum dynamics, and quantum computing, to coarse-grained models for biological systems. Many well-wishers spoke up between sessions. The meeting lasted all day and attendance was consistently recorded at over 100 individuals, peaking at about 140. Attendees included a broad cross-section of the chemistry community as well as program officers from other agencies such as DOE and the Airforce, and many from other divisions within NSF. Evi was recognized as an inspiration and a pioneer as her career trajectory was traced all the way back to high school."

## WELCOME TO OUR NEW STAFF MEMBERS

**Dr. Michel Dupuis**

Dr. Michel Dupuis is currently a Professor of Research in the Department of Chemical and Biological Engineering, at the University at Buffalo. Dr. Dupuis is a world-renowned Computational Chemist. His research focuses on the rational design through computation and simulation of next generation of renewable energy materials, for efficient and cost-effective inter-conversion of electrical and chemical energy. Dr. Dupuis joins the Division as a Program Director in the Chemical Theory, Models, and Computational Methods (CTMC) and Chemical Catalysis (CAT) Programs.

**Dr. Christopher Elles**

Dr. Christopher Elles is an Associate Professor of Chemistry at the University of Kansas. His research uses ultrafast spectroscopy to study fundamental chemical reaction dynamics in the condensed phase, including the excited-state dynamics of photochromic molecular switches, photo-triggers, and photoactive materials. He joins the Division as a Program Director in the Chemical Structure, Dynamics, and Mechanisms A (CSDM-A) and Chemical Measurement and Imaging (CMI) Programs.

**Dr. George Richter-Addo**

Dr. George Richter-Addo is a Professor of Chemistry and former department chair at the University of Oklahoma. His research areas focus on synthetic bioinorganic and coordination chemistry, nitrogen oxides (NO<sub>x</sub>) in biology and the environment, and heme protein-NO<sub>x</sub> structural biology. He joins the Division as a Program Director in the Chemical Synthesis (SYN) and Chemical Catalysis (CAT) Programs.

**Dr. Herman Sintim**

Dr. Herman Sintim is the Drug Discovery Professor of Chemistry at Purdue University. His research areas are synthetic oligonucleotides, cyclic dinucleotides, G-quadruplexes, bacteria quorum sensing and biofilm formation, protein kinases, novel chemical libraries for drug screening, synthesized via multicomponent reactions. Dr. Sintim joins the Division as a Program Director in the Chemistry of Life Processes (CLP) and the Chemistry Research Experiences for Undergraduates (REU) Programs.

**Dr. Amanda Haes**

Dr. Amanda Haes is a Professor of Chemistry at the University of Iowa. Her research focuses on nanomaterials, plasmonics, normal and surface-enhanced Raman scattering, and sensor development. Dr. Haes and her group have hosted over 1,200 elementary and middle school students, teachers, and parents from local communities to the University of Iowa campus for various STEM activities. She is joining the division as a Program Director in the Macromolecular, Supramolecular, and Nanochemistry (MSN) and the Major Research Instrumentation Program (MRI) Programs.

**Dr. Nicolay Tsarevsky**

Dr. Nicolay Tsarevsky is currently an associate professor at the Department of Chemistry at Southern Methodist University. His research interests include polymerization techniques, functional materials, coordination chemistry and catalysis, and the chemistry hypervalent compounds, in addition to history of chemistry and chemical education. He joins the Division as a Program Director in the Macromolecular, Supramolecular, and Nanochemistry (MSN) program.



#### Dr. John Papanikolas

We also welcome Dr. John Papanikolas back to the Division. Dr. John Papanikolas is currently a Professor of Chemistry at the University of North Carolina, Chapel Hill. Research in his group is directed at the characterization of complex chemical systems using femtosecond laser spectroscopy. John rejoins the Division as a part-time Expert, and works in the Macromolecular, Supramolecular, and Nanochemistry (MSN) Program.



#### Dr. Charles Pibel

We also welcome Dr. Charles Pibel back to the Division. Dr. Pibel is currently the Associate Dean of School of Science and Technology and an Associate Professor of Chemistry at Georgia Gwinnett College. Dr. Pibel is in the field of molecular spectroscopy and chemical dynamics, and atmospheric chemistry. He rejoins the Division as a part-time Expert and works in the Environmental Chemical Sciences (ECS) Program.

### FAREWELL TO THE FOLLOWING STAFF MEMBERS



#### Dr. Walter Ermler

Dr. Walter Ermler, Program Director, provided his expertise in the Chemical Theory, Models, & Computational Methods (CTMC) and the Research Experiences for Undergraduates in Chemistry (REU) programs. Dr. Ermler is missed by his colleagues and has returned as a Professor at the University of Texas at San Antonio at the end of the summer.



#### Dr. Jong-In Hahm

Dr. Jong-In Hahm returned to Georgetown University and the Hahm Research Group at the end of the summer. She was a Program Director in the Macromolecular, Supramolecular & Nanochemistry (MSN) program. Dr. Hahm is missed as a colleague and we look forward to collaborating with her in the future.



#### Dr. P. Shing Ho

Dr. P. Shing Ho, Program Director, was a valuable member of the Chemical Life Processes (CLP) team and division. He has returned to Colorado State University as a Professor, in the Biochemistry & Molecular Biology Department, but remains as a part-time Expert in the CLP program.



#### Dr. Tomislav Pintauer

Dr. Tomislav Pintauer has returned to Duquesne University as a Professor at the end of the summer. He provided his Polymer expertise in the Macromolecular, Supramolecular & Nanochemistry (MSN) program. He was a great addition to CHE team and is greatly missed.



#### Dr. Thomas Rauchfuss

Dr. Thomas Rauchfuss will be returning as the Larry Faulkner Research Professor of Chemistry at the University of Illinois in the beginning of fall. Dr. Rauchfuss is currently a Program Director in the Chemical Catalysis (CAT) and Chemical Synthesis (SYN) programs. His expertise will be missed in the programs and missed by the Chemistry team.



#### Ms. Marla Stewart

Ms. Marla Stewart has left the CHE Division and joined the Division of Chemical, Bioengineering, Environmental, and Transport Systems (CBET) within the Engineering Directorate (ENG) as the Operation Specialist. Congratulations on your promotion and new opportunity, Marla!

**C. Michelle Jenkins** has left the Division of Chemistry and accepted a position as a Conference and Events Specialist in the Division of Administrative Services (OIRM/DAS), after having the opportunity to be on a professional development detail for several months. Congratulations and best wishes on your promotion, Michelle.

The Chemistry Division would like to thank all the departing staff members for supporting NSF's mission. Our colleagues will be greatly missed, and we wish them success in their future endeavors.

An updated *staff list* is available on the CHE webpage.

## RECRUITING ROTATORS

### WOULD YOU LIKE TO JOIN CHE AS A ROTATOR?

An integral subset of our program directors are rotators - members of the chemistry community who serve at NSF for 1-4 years – then return to their home institution. Rotators bring fresh perspectives from their research community, make award and declination recommendations, and help to guide the division's portfolio balance and initiatives. CHE Rotators also have a unique opportunity to survey their field and gain a more multi-disciplinary lens, build leadership skills, and mentor the next generation of investigators. While serving as a program director at NSF, rotators may also continue their research at their home institution through the Independent Research/Development program. The Division of Chemistry needs program directors with experience in all fields of chemistry.

Most rotators join in the Fall, but it is not too early to think about next year! Maybe 2022 is the year when you would be able to come to NSF to learn about, and participate in, the other side of the grants process? If you are interested, we would like to hear from you. Please reach out to our current staff with any questions, visit the [Career Opportunities section](https://www.nsf.gov/publications/vacancy.jsp?org=CHE&nsf_org=CHE) ([https://www.nsf.gov/publications/vacancy.jsp?org=CHE&nsf\\_org=CHE](https://www.nsf.gov/publications/vacancy.jsp?org=CHE&nsf_org=CHE)) on our divisional website for information on how to apply, or visit the [NSF Careers home page](https://www.nsf.gov/careers/) (<https://www.nsf.gov/careers/>) for more information on being a rotator.

## CHE COVID-19 EFFORT

### (NATIONAL SCIENCE FOUNDATION SUPPORT OF CHEMISTRY TO ADDRESS THE COVID-19 PANDEMIC)

Among the many challenges that this country and the world is coping with in 2020, perhaps the most unexpected and far reaching is the Coronavirus Disease 2019 (COVID-19) pandemic. This disease, caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has led to global health and economic crises. The initial report of a cluster of pneumonia cases, eventually associated with a novel coronavirus, was made by the Wuhan Municipal Health Commission of China on December 31, 2019, leading to the publication of a Disease Outbreak News by the World Health Organization (WHO) on January 10, 2020 (<https://www.who.int/news-room/detail/27-04-2020-who-timeline---covid-19>). By mid-January, the first infection outside of China was reported in Thailand, and by late January and early February, infections were uncovered across Asia, Europe and the Americas. On March 11, the WHO declared that the virus had reached pandemic levels.

Recognizing the health and economic impacts and the swift spread of this new coronavirus, the National Science Foundation released a Dear Colleague Letter (DCL) on COVID-19 ([NSF 20-052](#)). The DCL utilized NSF's Rapid Response Research funding mechanism to support research that could have an immediate impact on the COVID-19 pandemic, and was supported in part through the federal Coronavirus Aid, Relief, and Economic Security (CARES) Act. While the DCL has now been archived, the NSF made nearly 1,000 awards under this initiative.

The divisions within the Mathematical and Physical Sciences (MPS) Directorate of the NSF have helped to mobilize the scientific communities in chemistry, mathematics, materials, and physics (including the astronomical sciences) to tackle a broad range of topics associated with COVID-19, including: epidemiologic forecasting; protein and genome modeling and analyses; personal protection equipment design and disinfection; inhibitor design; infection interventions; and vaccine platform development among many others.

**The Division of Chemistry (CHE) has made 16 awards to support 13 distinct projects under the NSF RAPID COVID-19 DCL.** The awards were made through the Rapid Response Research (RAPID) and Early-Concept Grants for Exploratory Research (EAGER) mechanisms. Additionally, the Division of Chemistry has made supplements to existing awards; has jointly funded a COVID-19 postdoctoral fellowship program with the Divisions of Materials Research (DMR), Physics, and Astronomical Sciences; has co-funded RAPID proposals with the Divisions of Mathematical Sciences (DMS) and Materials Research (DMR); and has contributed funding to the Molecular Sciences Software Institute (MolSSI) through the Office of Advanced Cyberinfrastructure (OAC) to support COVID 19 research by serving as a repository for simulation data relevant to and providing MolSSI Software Seed Fellowships for Ph.D. students and postdoctoral associates.

The projects funded and co-funded by the Division of Chemistry support research that apply chemical principles to characterize, model, or detect SARS-CoV-2 and to develop technologies as potential interventions against coronavirus infection. These studies are expected to provide fundamental insights into the molecular workings of SARS-CoV-2 and potentially lead to technologies to address the current COVID-19 pandemic, as well as future coronavirus related diseases.

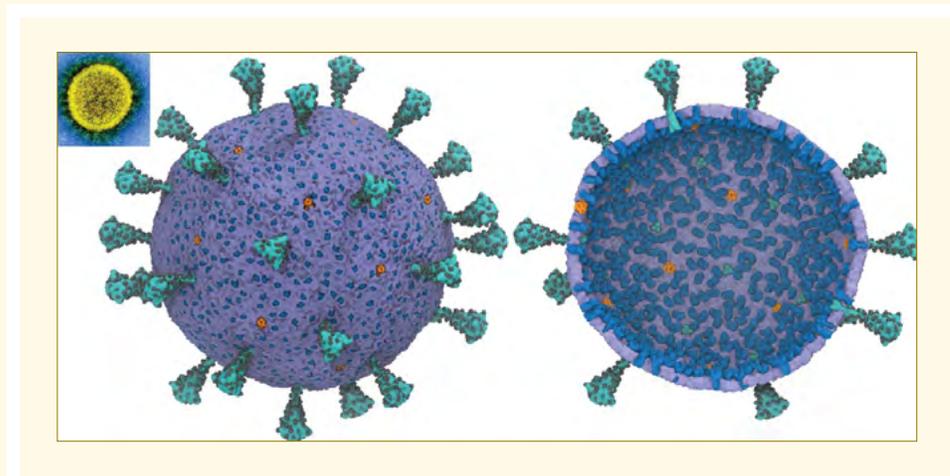


Figure 1. Complete coarse-grain model of SARS-CoV-2 proteins (Courtesy of G. Voth, University of Chicago).

### MODELING CORONAVIRAL PROTEINS

The division has funded several studies to model the viral proteins with the goal of identifying potential druggable targets. A project from **Dr. Gregory Voth** (University of Chicago) will develop atomistic models of essential viral proteins, coarse grain models proteins that constitute the complete viral particle, and apply machine-learning approaches to link the atomic and coarse grain level models (an initial coarse grain model of the entire virion is shown in Figure 1). **Dr. Mary Jo Ondrechen's** group at Northeastern University is applying artificial intelligence (AI) to computationally identify crevices and pockets in viral proteins that could serve as potential alternative recognition sites for antiviral compounds, and to search large databases of chemical molecules that bind to these sites. The Divisions of Mathematical Sciences and Chemistry are co-funding an interdisciplinary group led by **Dr. Javier Arsuaga** (University of California, Davis) to characterize mutations to the viral spike (S) protein using a combination of graph theory and topological data analysis as a strategy to design peptides that bind to the host Human Angiotensin-Converting Enzyme 2 (ACE2) target.

### CORONAVIRUS RNA GENOME

The RNA of SARS-CoV-2 encodes the enzymes and structural proteins and coordination of the transcription, processing and replication of the genomic information is critical to the life cycle of the coronavirus. **Dr. Victoria J. DeRose** (University of Oregon) is developing platinum-based RNA cross-linking tools to characterize the three-dimensional structure of the viral RNA genome. **Drs. Mihaela-Rita Mihailescu** and **Jeffrey D. Evanseck** at Duquesne University are studying interactions between distant regions of the RNA (including “kissing complexes”) that facilitate genomic recombination events. The project from **Dr. Tamar Schlick** at New York University is co-funded by the Divisions of Mathematical Sciences and Chemistry to develop a computational model for the RNA in order to facilitate identification of structural motifs that could potentially serve as binding sites for antiviral compounds.

### SPECTROSCOPIC DETECTION OF CORONAVIRUSES

Detection of viruses and viral infection is a critical tool in the arsenal to control COVID-19 and other epidemics and pandemics, and several awards have been made by the Chemistry Division to support this effort. The research group headed by **Dr. Slava Rotkin** at Pennsylvania State University is developing a 3-D printed sensor device that uses fluorescently labeled magnetic nanoparticles attached to coronaviral glycoproteins to concentrate and detect low doses of viral particles. A supplement to an NSF CAREER award allows **Dr. Xiaoji Xu** at Lehigh University to use an ultra-high-resolution microscopy method to examine the presence of virus particles in different types of sample environments by taking advantage of an imaging method he is developing, which is chemically sensitive due to its integration of vibrational spectroscopy.

## CORONAVIRUS DETECTION THROUGH ELECTROCHEMISTRY

**Dr. Gangli Wang** at Georgia State University uses electrode-immobilized probes that, upon binding a specific RNA sequence, triggers an electron-transfer pathway to sense the presence of a single-copy of the viral genome. Supplemental funding to an existing NSF award allows **Dr. Jeffery Dick** at the University of North Carolina (Chapel Hill) to develop electrochemical methods to detect viral particles, host antibodies, or other chemical metabolic markers as point-of-care diagnostic detection of SARS-CoV-2 infection.

## MOLECULAR INHIBITORS

Chemistry can be applied to facilitate the development of molecular interventions to stem the spread of COVID-19. **Dr. Xiaohong Tan** at Bowling Green University is applying directed molecular evolution strategies to evolve DNA aptamer sequences that recognize the SARS-CoV-2 spike protein and linking two or more such aptamers together to increase their affinities in order to interfere with binding to the host ACE2 receptor. The collaborative projects of **Dr. Bryan Berger** (University of Virginia) and **Dr. Jeffery Klauda** (University of Maryland) applies computation and experimental approaches to investigate and potentially disrupt the interactions of proteins encoded by the open-reading frames orf7a and orf7b with hosts proteins during viral propagation.

## MUCUS AND COUGH DROPLETS

Mucus membranes are barriers against and one of the first points of entry during viral invasion. **Drs Stephen L. Craig** and **Michael Rubinstein** of Duke University and **Bradley D. Olsen** of the Massachusetts Institute of Technology are engaged in a collaborative project to develop “bottle-brush” polymers that mimic the properties of naturally occurring mucin that serve as molecular decoys to prevent binding of coronavirus to respiratory surfaces. The Divisions of Materials Research and Chemistry are co-funding the project from **Dr. Jessica Kramer**’s group (University of Utah) to study the interactions of simulated cough droplets, produced from various types of mucus, with human cells coated with varied mucus in order to identify the forms of mucus that facilitate COVID-19 transmission and develop inhibitors to disrupt the binding of viral particles to mucus membranes.

## SMART SWABS, STERILIZED MASKS, AND VACCINE PLATFORMS

The project in **Dr. Sankaran Thayumanavan**’s group (University of Massachusetts Amherst) takes advantage of the SARS-CoV-2 main protease (Mpro) to design a “smart” testing swab that changes color when a colorless “prochromatic” compound is cleaved by the Mpro enzyme to create a highly colored or fluorescent signal. **Dr. Richard Peltier** at the University of Massachusetts Amherst is testing the effects of various sterilization techniques (vaporized hydrogen peroxide treatment, photochemical ultraviolet light or microwave irradiation) on the airflow and particulate retention properties of the polymer materials in N95 masks to determine the efficacy of sterilization and reuse of these respirators. **Dr. Angad Mehta**’s project at the University of Illinois (Urbana-Champaign) engineers a variant of SARS-CoV-2 that is dependent on an unnatural form of the S-adenosylmethionine cofactor for the methylation of its RNA genome and, therefore cannot replicate in a native host cell, but can elicit an immunological response.

## CHE VIRTUAL OFFICE HOURS

To better engage the community to share the information on new NSF funding opportunities and to answer questions and concerns, the Division of Chemistry (CHE) has held a biweekly Virtual Office Hour since April 17, 2020. Past topics include a discussion on COVID-19 and its impact on research and funding; NSF-wide Faculty Early Career Development Program (CAREER), NSF-wide Research Experiences for Undergraduates (REU) Program, and Division of Chemistry Disciplinary Research Programs (CHE-DRP) (NSF 20-577) Solicitation, Centers for Chemical Innovation (CCI) (NSF 20-574) Solicitation, DCL: Pilot Projects to Integrate Existing Data and Data-Focused Cyberinfrastructure to Enable Community-level Discovery Pathways (NSF 20-085) Solicitation, and Historically Black Colleges and Universities – Excellence in Research (HBCU-EiR) Solicitation. For more information about the past office hours and the presentation decks, please visit: [https://www.nsf.gov/news/news\\_summ.jsp?cntn\\_id=300572&org=CHE](https://www.nsf.gov/news/news_summ.jsp?cntn_id=300572&org=CHE).

We welcome you to join us for future Virtual CHE Office Hours, occurring on every other Friday, 4-5pm, Eastern time. The meeting date, the topic, and the zoom link will be shared in advance through the CHE listserv email. To sign up the listserv email, please send an email request to [CHEM-COMM@LISTSERV.NSF.GOV](mailto:CHEM-COMM@LISTSERV.NSF.GOV).

Please also feel free to submit your question or suggested topics for future virtual CHE Office Hour to [chemhighlights@nsf.gov](mailto:chemhighlights@nsf.gov).

## FUNDING OPPORTUNITIES

**a. Revised Chemistry Disciplinary Research Programs (CHE-DRP) Solicitation: [NSF 20-577](#).** The NSF Division of Chemistry (CHE) supports a large and vibrant research community engaged in fundamental discovery, invention, and innovation in the chemical sciences. The projects supported by CHE explore the frontiers of chemical science, develop the foundations for future technologies and industries that meet changing societal needs, and prepare the next generation of chemical researchers.

This solicitation covers individual investigator and small team proposal submission to the nine CHE [Disciplinary Research Programs](#) (DRP). The submission windows for the CHE-DRP remain unchanged.

Please note the following changes from the previous CHE-DRP:

- The modified Current and Pending Support form is no longer required. Please use the standard NSF format.
- The additional Revision statement is no longer required.
- Proposers may serve on up to two proposals: A PI may serve on one single-investigator proposal to the CHE Disciplinary Research Program and may participate as PI, co-PI or senior personnel in one additional multi-investigator or collaborative proposal per funding cycle. This restriction includes proposals under Grant Opportunities for Academic Liaison with Industry (GOALI) and Facilitating Research at Primarily Undergraduate Institutions (RUI).

Proposals for EAGER, RAPID, RAISE, and conferences, as well as supplemental funding requests to existing grants, are not subject to this limitation and may be submitted at any time after consultation with the cognizant NSF Program Officer.

Proposals submitted to other solicitations (e.g., Centers for Chemical Innovation, Major Research Instrumentation, Research Experiences for Undergraduates (REU) Sites, or CAREER) are also not subject to the limit on proposal submissions.

Proposals submitted in response to this solicitation should be submitted in accordance with the revised NSF Proposal & Award Policies & Procedures Guide (PAPPG) (NSF 20-1), which is effective for proposals submitted, or due, on or after June 1, 2020. Please note, in particular, the new guidelines on Biographical Sketches.

**b. MPS Alliances for Graduate Education and the Professoriate (AGEP) – Graduate Research Supplements (GRS) Dear Colleague Letter ([NSF 20-083](#)):** The Directorate of Mathematical and Physical Sciences (MPS) has long promoted efforts to recruit and retain students from underrepresented groups in all areas of the mathematical and physical sciences. AGEP-GRS is a mechanism by which a current MPS research awardee is able to support one (additional) Ph.D. student in an ongoing MPS-funded research project. The goal is to create an opportunity to engage additional students in research, to develop a positive learning environment for students, and to improve diversity and retention at the doctoral level within the mathematical and physical sciences. This opportunity is available to PIs with current MPS research awards whose institutions and/or academic units are either currently participating in the EHR-sponsored AGEP program; or whose institutions and/or academic units have participated in the AGEP program in the past (AGEP Legacy institutions). Such PIs may apply to MPS for a supplement to defray the costs for: stipend, tuition, benefits, and indirect costs for a graduate research student working on the MPS-funded research.

While the main focus of the AGEP-GRS program is support of graduate students in a doctoral program, the program will also consider support for a graduate student in a Master's degree-only granting program, provided that the student is both a) doing a research - based masters project and b) planning on joining a doctoral program within 12 months. Such support is limited to the last year of the Master's student's work.

There is no deadline for submissions; supplemental funding requests may be submitted at any time. For additional detail, please refer to the web site and the contacts listed there.

**For more information** about on-going funding opportunities for the chemical sciences, please visit our division websites regularly at

[https://www.nsf.gov/news/news\\_summ.jsp?cntn\\_id=137576&org=CHE](https://www.nsf.gov/news/news_summ.jsp?cntn_id=137576&org=CHE) for new solicitations and

[https://www.nsf.gov/news/news\\_summ.jsp?cntn\\_id=131983&org=CHE](https://www.nsf.gov/news/news_summ.jsp?cntn_id=131983&org=CHE) for on-going DCLs.

## CHE'S OUTREACH IN 2020

### • American Chemical Society (ACS) Fall 2020 Virtual Meeting and Expo

This year the American Chemical Society's Fall National Meeting went virtual, and CHE still had a presence. Division Director Dave Berkowitz gave several talks outlining funding opportunities, priority scientific areas, and ways in which CHE supports broadening participation and workforce development. CHE also had a virtual booth space at the Expo, which had the latest CHE content and ways to get in touch with us virtually. Those not attending the virtual ACS meeting this year were still able to interact with, and hear from, CHE through public events that included a federal funder virtual townhall and virtual speed coaching.

### • 47th Annual Meeting, National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (NOBCCHE)

Members of the Chemistry Division will attend NOBCCHE's 47th conference virtually on September 24 – 25, 2020. Chemistry staff will participate in the Career fair, Poster session, and Science Festival Day.

The NSF seminar will cover proposal preparation, merit review, navigating NSF, and funding opportunities. NSF representatives will be available for discussion throughout the conference. Further details on events and locations will be made available on our website at [www.nsf.gov/chem](http://www.nsf.gov/chem).

### • Outreach trips to Southern Universities

Over the last two years, Program Director Tingyu Li and Program Specialist Darren Kimble from the Chemistry Division, visited four universities in the south including two HBCUs. The universities visited are Jackson State University in Mississippi, Grambling State University in Louisiana, Texas A&M University – Texarkana, and Louisiana State University at Shreveport. During the trips, they toured the chemistry facilities and learned about their research activities. They held meetings with faculty members and university administrators to discuss NSF funding opportunities that might be well suited for the specific department. In their meetings, they also discussed the NSF review process and how to better navigate the NSF funding processes. In addition to meetings with faculty, they interacted with graduate and undergraduate students. The talk at Grambling State University attracted many chemistry majors and they held a separate session with these undergraduate students to discuss career choices in Chemistry. They provided refined career assistance to some of the talented undergraduate students and built lasting relationships with some of them. The visits helped NSF to better understand and serve the needs of specific chemistry communities



## 2021 NSF CHEMISTRY EARLY CAREER INVESTIGATOR WORKSHOP

After taking 2020 off, planning for the 2021 NSF-CHE Early Career Investigator Workshop will begin soon. The next workshop will most likely be held in late Spring 2021. Please monitor NSF-CHE announcements for updates.

## CHEMISTRY HIGHLIGHTS

CHE loves hearing about our investigators' great research. Please share notable results and upcoming publications with your managing Program Director and/or forward information the CHE highlights email account at [chemhighlights@nsf.gov](mailto:chemhighlights@nsf.gov). Investigators are especially encouraged to work with their institution's press office to create polished products highlighting the work. The permission form can be found at: <https://www.nsf.gov/mps/che/Highlights/HighlightWebpages/highlights.jsp>.

CHE highlights often make appearances on some of NSF's many social media channels, including Facebook, Twitter (@NSF and @NSF\_MPS), and NSF's News from the Field. Many thanks to Melissa Olson, CHE's Associate Program Director, for coordinating these efforts!

## NEW 2020 CHEMISTRY CAREER AWARDEES

### Congratulations to the NSF/Chemistry 2020 CAREER Awardees!

The faculty Early Career Development (CAREER) Program is a Foundation-wide activity that offers the NSF's most prestigious awards in support of junior faculty who exemplify the role of teacher-scholars through outstanding research, excellent education and the integration of education and research within the context of the mission of their organizations. Such activities should build a firm foundation for a lifetime of leadership in integrating education and research.

We hereby recognize the NSF/CHE CAREER Awardees, Class of 2020!



**VICTOR ACOSTA**  
*University of New Mexico*

**Award Number:**  
1945148

**Title:**  
CAREER: Picoliter Nuclear Magnetic Resonance Spectroscopy with Diamond Quantum Sensors



**OLIVIERO ANDREUSSI**  
*University of North Texas*

**Award Number:**  
1945139

**Title:**  
CAREER: Multiscale and Machine Learning Approaches for Electrified Interfaces



**CHRISTOPHER BAKER**  
*University of Tennessee Knoxville*

**Award Number:**  
1944902

**Title:**  
CAREER: Capillary electrophoretic mobility spectrometry - a solution phase analog to ion mobility spectrometry



**JEFFREY BANDAR**  
*Colorado State University*

**Award Number:**  
1944478

**Title:**  
CAREER: New Catalytic Methodology Enabled by Superbase Chemistry



**ESZTER BOROS**  
*SUNY at Stony Brook*

**Award Number:**  
1942434

**Title:**  
CAREER: Exploring Cherenkov Radiation for the In Situ Excitation of Discrete Luminescent Lanthanide Complexes



**JUSTIN R. CARAM**  
*University of California-Los Angeles*

**Award Number:**  
1945572

**Title:**  
CAREER: New Probes of Heterogeneity in Next-Generation Nanocrystal Emitters



**KELLY N. CHACÓN**  
*Reed College*

**Award Number:**  
1945661

**Title:**  
**CAREER: CAS: Spectroscopic Investigations of Biological Tellurium and Selenium Detoxification**



**MELANIE CHIU**  
*SUNY at Stony Brook*

**Award Number:**  
1945271

**Title:**  
**CAREER: Photomodulation of Polymer Molecular Weight Distribution**



**JOSEPH A. COTRUVO**  
*Pennsylvania State Univ University Park*

**Award Number:**  
1945015

**Title:**  
**CAREER: Understanding the coordination chemistry of lanthanide-binding proteins for rare earth element sensing, capture, and recycling**



**XIN CUI**  
*Mississippi State University*

**Award Number:**  
1945425

**Title:**  
**CAREER: Ruthenium-Catalyzed Stereoselective and Site-selective Functionalization of Carbon-Hydrogen Bond**



**PRAVAS DERIA**  
*Southern Illinois University at Carbondale*

**Award Number:**  
1944903

**Title:**  
**CAREER: Framework Topology Dependent Photophysical Properties of Chromophore Assemblies within Metal-Organic Frameworks**



**ROBERT A. DISTASIO**  
*Cornell University*

**Award Number:**  
1945676

**Title:**  
**CAREER: Accurate, Reliable, and Routine First-Principles Prediction of the Structure and Stability of Molecular Crystal Polymorphs**



**BYRON H. FARNUM**  
*Auburn University*

**Award Number:**  
1945160

**Title:**  
**CAREER: Multi-Electron Nickel Redox Cycles for Solar Energy Conversion and Storage**



**XIAOFENG FENG**  
*The University of Central Florida Board of Trustees*

**Award Number:**  
1943732

**Title:**  
**CAREER: CAS: Understanding and Tuning the Electrohydrogenation Mechanisms for Ambient Nitrogen Fixation**



**ELYSSIA GALLAGHER**  
*Baylor University*

**Award Number:**  
1945078

**Title:**  
CAREER: Rapid H/D Exchange-Mass Spectrometry: Novel Methods for Identifying Glycan Isomers and Glycoconjugate Dynamics



**ISAAC GARCIA-BOSCH**  
*Southern Methodist University*

**Award Number:**  
1941220

**Title:**  
CAREER: Catalysis with copper complexes bearing redox-active ligands with tunable hydrogen-bonding donor



**NAGARJUNA GAVVALAPALLI**  
*Georgetown University*

**Award Number:**  
1944184

**Title:**  
CAREER: Bifacial Cyclophanes for Solution-Phase Synthesis of Semiconducting Porous Nanoribbons



**JASON D. GOODPASTER**  
*University of Minnesota-Twin Cities*

**Award Number:**  
1945525

**Title:**  
CAREER: Machine Learning: How Electrons Correlate



**KU-LUNG HSU**  
*University of Virginia Main Campus*

**Award Number:**  
1942467

**Title:**  
CAREER: Next-Generation Flow Cytometry - A New Approach to Cell Heterogeneity



**NAN JIANG**  
*University of Illinois at Chicago*

**Award Number:**  
1944796

**Title:**  
CAREER: Probing Chemistry of Surface-Supported Nanostructures at the Angstrom-Scale



**GERALD KNIZIA**  
*Pennsylvania State Univ University Park*

**Award Number:**  
1945276

**Title:**  
CAREER: Quantum embedding of wave-function methods as path to high-accuracy thermochemistry in heterogeneous catalysis



**JAKUB KOSTAL**  
*George Washington University*

**Award Number:**  
1943127

**Title:**  
CAREER: Mechanistic Investigation of Chemical Photodegradation to Aid in Novel Pesticide Design



**MARKOS KOUTMOS**  
*University of Michigan Ann Arbor*

**Award Number:**  
1945174

**Title:**  
**CAREER: Harnessing large protein conformational changes to perform remarkable chemical reactions**



**HENRY LA PIERRE**  
*Georgia Tech Research Corporation*

**Award Number:**  
1943452

**Title:**  
**CAREER: Valence Orbital Control in f-Block Complexes**



**JIANING LI**  
*University of Vermont & State Agricultural College*

**Award Number:**  
1945394

**Title:**  
**CAREER: Data-Driven Systematic Hierarchical Modeling**



**XI LING**  
*Trustees of Boston University*

**Award Number:**  
1945364

**Title:**  
**CAREER: Deciphering 2-Dimensional, Crystal-Mediated, Surface-Enhanced Raman Scattering for Quantitative Analysis**



**LONG LUO**  
*Wayne State University*

**Award Number:**  
1943737

**Title:**  
**CAREER: CAS: Developing Gas Bubbles as a New Tool for Surface-Active Agent Analysis**



**EVANGELOS MILIORDOS**  
*Auburn University*

**Award Number:**  
1940456

**Title:**  
**CAREER: CDS&E: State-of-the-art quantum calculations on a novel class of super-atoms: Discovering exotic chemical bonding schemes and proposing new two and three dimensional materials**



**KATHERINE MIRICA**  
*Dartmouth College*

**Award Number:**  
1945218

**Title:**  
**Conductive Framework Materials for Ultrasensitive, Low Power Detection of Gases**



**RAYMOND MOELLERING**  
*University of Chicago*

**Award Number:**  
1945442

**Title:**  
**CAREER: Reactivity-Driven Metabolic Signaling: A Feature not a Flaw in Metabolic Regulation**



**MAHMOUD MORADI**  
*University of Arkansas*

**Award Number:**  
1945465

**Title:**  
CAREER: Riemannian Reformulation  
of Collective Variable Based Free Energy  
Calculation Methods



**JIA NIU**  
*Boston College*

**Award Number:**  
1944512

**Title:**  
CAREER: CAS: Radical  
Cascade-Driven Polymerization  
and Depolymerization



**JEAN HUBERT OLIVIER**  
*University of Miami*

**Award Number:**  
1941410

**Title:**  
CAREER: Molecular Tools to Tune  
the Structure-Function Properties of  
Nanoscale Objects by Reconfiguration  
of pi-conjugated Superstructures



**JULIA H. ORTONY**  
*Massachusetts Institute of Technology*

**Award Number:**  
1945500

**Title:**  
CAREER: Fundamentals of  
conformational and surface water  
dynamics in supramolecular nanofibers



**MYLES POULIN**  
*University of Maryland College Park*

**Award Number:**  
1945162

**Title:**  
CAREER: Next Generation Kinetic  
Isotope Effect Measurements for  
the Analysis of Glycosyltransferase  
Enzyme Mechanisms



**EMILY QUE**  
*University of Texas at Austin*

**Award Number:**  
1945401

**Title:**  
CAREER: Inorganic Scaffolds  
as Activity Based Probes for  $^{19}\text{F}$   
Magnetic Resonance Biosensing



**HANS RENATA**  
*The Scripps Research Institute*

**Award Number:**  
1945468

**Title:**  
CAREER: Chemoenzymatic  
Total Synthesis of Terpenoids via  
P450 Catalysis



**CAROLINE SAOUMA**  
*University of Utah*

**Award Number:**  
1945646

**Title:**  
CAREER: Understanding how catalyst  
modification impacts performance ?  
thermodynamic and kinetic parameters  
pertinent to catalytic hydrogenation of  
polar carbonyl bonds



**VALERIE A. SCHMIDT**  
*University of California-San Diego*

**Award Number:**  
1945463

**Title:**  
CAREER: New Catalytic Strategies  
Using Metal-Ligand Charge Transfer



**COLLEEN SCOTT**  
*Mississippi State University*

**Award Number:**  
1945503

**Title:**  
CAREER: Design and Synthesis  
of Heterocyclic Aryldiamine  
Polymers: Towards a New Class of  
Processable and Electrochemically Stable  
Conducting Materials



**MEI SHEN**  
*University of Illinois at Urbana-Champaign*

**Award Number:**  
1945274

**Title:**  
CAREER: Multimodal  
Nanoelectrochemistry to Characterize  
Nanometer and Microsecond Resolved  
Transmitter Release



**ALEXEY SILAKOV**  
*Pennsylvania State Univ University Park*

**Award Number:**  
1943748

**Title:**  
CAREER: Structural and mechanistic  
studies of a novel group of oxygen-  
tolerant [FeFe] hydrogenases



**NEIL C. TOMSON**  
*University of Pennsylvania*

**Award Number:**  
1945265

**Title:**  
CAREER: Surface-Inspired Catalysis via  
an Updated Cluster-Surface Analogy



**JOSEPH J. TOPCZEWSKI**  
*University of Minnesota-Twin Cities*

**Award Number:**  
1942223

**Title:**  
CAREER: Palladium or Gold  
Catalyzed Decarboxylative  
Functionalization of (Hetero)Arenes



**MIHAI VAIDA**  
*The University of Central Florida  
Board of Trustees*

**Award Number:**  
1943697

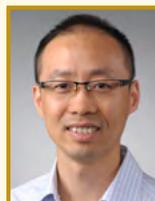
**Title:**  
CAREER: Ultrafast electron and  
molecular dynamics investigations  
on 2D nanostructured photocatalytic  
materials for the generation of fuels  
from renewable sources



**JUAN VANEGAS**  
*University of Vermont & State  
Agricultural College*

**Award Number:**  
1944892

**Title:**  
CAREER: Cellular mechanics at  
the nanoscale: Lipid membrane  
elasticity and force transduction in  
mechanosensitive proteins

**ALEXANDRA VELIAN***University of Washington***Award Number:**  
1944843**Title:**  
**CAREER: Elucidating and Harnessing  
Metal-Support Interactions using Designer  
Nanoclusters as Functional Models****CHRISTINA M. WOO***Harvard University***Award Number:**  
1942574**Title:**  
**CAREER: Nanobody technology  
to decipher the essential roles of  
O-GlcNAc in cells****XIN ZHANG***Pennsylvania State Univ University Park***Award Number:**  
1944973**Title:**  
**CAREER: Quantification of Cellular  
Proteome Stress and Recovery Using  
Chemical Methods****WEIWEI ZHENG***Syracuse University***Award Number:**  
1944978**Title:**  
**CAREER: Controlled Dopant  
Migration by Atomic Trapping for  
Site-Specific Doping in Nanocrystals**

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Ms. Debbie Jones	Operations Specialist	703-292-7852	djones@nsf.gov
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Dr. Herman Sintim	CLP, REU	703-292-7244	hsintim@nsf.gov
Dr. Suk-Wah Tam-Chang	MSN	703-292-8684	stamchan@nsf.gov
Dr. Nicolay Tsarevsky	MSN	703-292-2394	ntsarevs@nsf.gov

Chemistry Program Abbreviations
Chemical Catalysis (CAT)
Centers for Chemical Innovation (CCI)
Chemistry of Life Processes (CLP)
Chemical Measurement & Imaging (CMI)
Chemical Structure, Dynamics & Mechanisms A & B (CSDM A & B)
Chemical Theory, Models & Computational Methods (CTMC)
Environmental Chemical Sciences (ECS)
Major Research Instrumentation (MRI)
Macromolecular, Supramolecular & Nanochemistry (MSN)
Research Experiences for Undergraduates (REU)
Chemical Synthesis (SYN)

The mission of the Division of Chemistry is to promote the health of academic chemistry and to enable basic research and education in the chemical sciences. The Division supports research in all traditional areas of chemistry and in multidisciplinary fields that draw upon the chemical sciences. The Division also supports projects that help build infrastructure, workforce, and partnerships that advance the chemical sciences.

**DIVISION OF CHEMISTRY**  
National Science Foundation  
2415 Eisenhower Ave, Alexandria, Virginia 22314

For Newsletter inquiries, comments or questions, please contact:  
Valerie S. Maizel | Program Specialist, NSF Division of Chemistry  
Phone: 703-292-2529 | Email: [vmaizel@nsf.gov](mailto:vmaizel@nsf.gov)

