



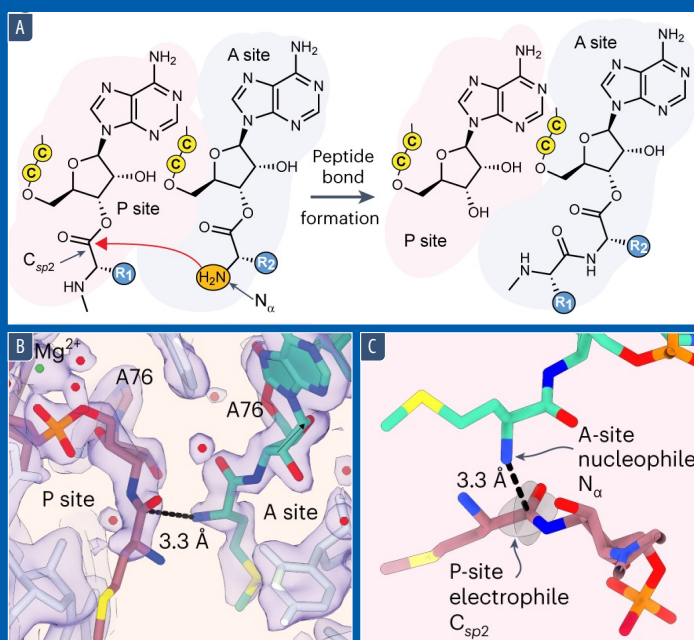
U.S. National Science Foundation  
 Directorate for Mathematical and  
 Physical Sciences

# CHE NEWSLETTER

## DIVISION OF CHEMISTRY

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(A) Schematic of peptide bond formation in the ribosome active site; (B) Cryo-EM density (indigo surface) and the author's model for Met residues in the peptidyl transferase center (PTC); (C) alternative view of the A-site and P-site Met residues. Credit: Watson et al. (2023), (10.1038/s41557-023-01226-w)



## CHE COMMUNICATION LISTSERV SIGN-UP

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## RIBOSOME CHEMISTRY

Ribosome chemistry is utilized by cells to generate sequence-defined proteins by translating genetic code in the assembly of  $\alpha$ -amino acid building blocks. Currently, there is great interest in manipulating this chemistry to produce sequence-defined chemical polymers from non-L- $\alpha$ -amino acids, enabling new backbones and polymerization chemistries. While the E. coli ribosome tolerates certain non-L- $\alpha$ -amino acids in vitro, knowledge about structural insights and the boundary conditions needed for efficient bond formation are sparse. Dr. Zoe Watson and colleagues at the NSF Center for Genetically Encoded Materials ([CHE-2002182](#)) used a metadynamics-based computational approach to understand how non-L- $\alpha$ -amino acids are accommodated within the ribosome active site. They found that reactive monomers favor a conformational space that is characterized by a distance of  $< 4 \text{ \AA}$  between the A-site nucleophile and the P-site carbonyl, and a Bürgi-Dunitz angle of  $90\text{--}110^\circ$  (doi: [10.1038/s41557-023-01226-w](#)). These findings along with the associated computational workflow should accelerate the design of monomers and associated translational chemistry to promote ribosomal synthesis of sequence-defined, non-peptide heterooligomers.



## UPDATE FROM THE DIVISION DIRECTOR

Dear Chemistry Colleagues,

As I write to you, we are just making our first CAREER awards of FY24 and I can tell you that is always a very motivating time for us here at NSF Chemistry. The breadth of creative science that we see put forth by the next generation of leaders in the academy of chemical sciences across the Nation is impressive. We feel that energy in the early career workshop that we have held in person here in Alexandria each of the last two years in the spring and that is slated for May 2024 again — stay tuned!

Fall is also the time that we welcome our new rotating Program Directors, and we have once again been very fortunate to attract some of the most creative, charismatic and team-oriented academics from around the country to join the NSF-Chemistry team: **Sarah Wengryniuk** (Temple University –synthesis/catalysis with a flair for hypervalent iodine chemistry); **Gang-Yu Liu** (UC-Davis-physicochemical basis of nano-assemblies; molecular nanoscience); **Pumtiwitt McCarthy** (Morgan State – enzymology with an interest in carbohydrate-processing); **Michael Greenlief** (U Missouri — all things instrumentation-with a PChem perspective); and **John Jewett** (U Arizona-chem-bio; bioorthogonal chemistry via masked diazonium FG-releasing chemistry). There is a lot of energy in Alexandria with their arrival.

I have been privileged to co-lead the Sustainable Chemistry Strategy Team (SCST) @ OSTP at the White House in response to the call from Congress in the National Defense Authorization Act of FY21 to report back on sustainable chemistry. I co-chair the SCST with **Kate Beers** (NIST) and **Ben Place** (OSTP). Our team works under the guidance of **Kei Koizumi**, Principal Deputy Director at OSTP and we have a team of over a dozen federal agencies. In August 2023, we released our Report to Congress (RtC) – Part 1 – **“Sustainable Chemistry Report: Framing the Federal Landscape”** This was followed by a multi-agency rollout of the report at NSF Headquarters, with an engaged array of stakeholders from the community (see photo-inset). This event helped to energize the community and stimulate discussion on the Strategic Plan for Sustainable Chemistry which will be the topic of our final RtC scheduled to be completed in 2024!



*Roll-Out of the Sustainable Chemistry Report to Congress hosted by the National Science Foundation on September 12, 2023 and streamed nationwide (opening remarks from Sean L. Jones (NSF-MPS AD; at the podium); Karen Marrongelle (NSF COO); Kei Koizumi (OSTP-Principal Deputy Director); and Stephanie Hooker (NIST) with David Berkowitz as Master of Ceremonies. Photo Credit: Alex Cronin, Program Director-NSF Physics*

Related to this discussion, in Fall 2022, the University-Industry Demonstration Partnership (UIDP) led by **Anthony Boccanfuso** led a workshop on building partnerships between academia and industry with a sustainable chemistry subtheme. You can read the report from that workshop, "***Aligning Interests in Support of Chemistry Research***." This meeting has led to an animated discussion on how we at NSF Chemistry might partner with the Chemical Industry for the good of the whole — stay tuned!

And speaking of sustainable chemistry, the Division put forward a Dear Colleague Letter: **Critical Aspects of Sustainability (CAS): Innovative Solutions to Sustainable Chemistry (CAS-SC)** (NSF 22-111) to encourage research across all of our core programs that address societal challenges in this scientific space. The CHE Division supported eight awards in FY23 that align with CAS-SC through the CAT, CSDM-A, and SYN programs. One particularly notable award is for a collaborative effort among Alan Goldman (Rutgers U), Patrick Holland (Yale), and Alexander Miller (UNC-Chapel Hill) on the electrochemical conversion of atmospheric nitrogen ( $N_2$ ) to ammonia ( $NH_3$ ) using molecular catalysts (***CHE-2247257/2247258/2247259***) as is described more below.

In our CCI Program, the CAICE (***Center for Aerosol Impacts on Chemistry of the Environment***) CCI co-led by Kim Prather and Vicki Grassian of UC-San Diego "graduated" after a full ten year run as a Phase II Center. CAICE celebrated the diversity of science developed by the team at a full day symposium at the Fall National ACS Meeting in San Francisco. Impacts here are wide-ranging from fundamental chemistry of oxidized nitrogen species, to aerosol formation and compositions and their impact on cloud behavior, to aerosols as a vehicle for viral transmission!

As is the nature of our CCI portfolio life cycle, just as one Phase II center graduates, a new Phase II center is inaugurated. Namely the CMCC (***Center for the Mechanical Control of Chemistry***) led by James Batteas at Texas A & M University is now in full throttle mode, working to understand how to drive chemistry with mechanical force both from an experimental and theoretical point of view.

Chemistry is, of course, 'the central science' and given recent Nobel prizes in Chemistry related to (i) directed evolution of enzymes (**Frances Arnold-2018**); (ii) design of a CRISPR-Cas9 system for DNA-editing (**Jennifer Doudna and Emmanuelle Charpentier-2020**); and (iii) bioorthogonal chemistry (**Carolyn Bertozzi, K. Barry Sharpless and Morten Meldal-2022**), it is clear that chemistry is central to the development of disruptive biotechnologies. With this in mind and inspired by the new Technology Innovation and Partnerships (TIP) Directorate at NSF, we at NSF-CHE launched a new initiative to seed cross-disciplinary, high risk-high reward research that might open up new avenues for chemistry-centric biotechnology research, and perhaps even lead to the nucleation of new start-ups, if ultimately successful. This ***Molecular Foundations for Biotechnology (MFB)*** solicitation is now in its third year and each year an exciting cadre of proposals has been funded. Themes by proposal year have been: **FY21**-Small molecule-protein interactions; **FY22**-Artificial Intelligence (AI)/Machine Learning (ML)-driven studies of biomacromolecular function/higher order structure; and **FY23/24**-RNA sciences – tools development to better understand and control RNA function and drive RNA-based biotechnology. This has been a Foundation-wide partnership, and, most recently, also an interagency partnership! *Thus, the current FY23-24 MFB competition represents a partnership across 4 directorates (MPS, BIO, CISE & ENG) and 6 divisions (CHE, PHY, DMS, MCB, IIS & CBET) within NSF and with the National Human Genome Research Institute (NHGRI) at NIH!*

In the emerging area of **Quantum Information Science & Engineering (QISE)**, of course, chemistry is also central. Here, in addition to a cadre of awards in the core programs in QISE, CHE currently funds three CCI Phase I centers (\$1.8 M investments) in this space:

- ***Center for Quantum Electrodynamics for Selective Transformations (QuEST)***
- ***Center for Quantum Dynamics on Modular Quantum Devices (CQD-MQD)***
- ***Center for Advanced Molecular Architectures for Quantum Information Science***

There is also a large **Quantum Leap Challenge Institute (QLCI)** funded as part of this Foundation-wide initiative that has major chemistry and biology components:

- ***Quantum Leap Challenge Institute for Quantum Sensing in Biophysics and Bioengineering***

Recently, as is described below, the portfolio for the Quantum Sensing Challenges for Transformational Advances in Quantum Systems (QuSeC-TAQS) competition features a rich array of chemistry.

And we are pleased to announce that NSF-CHE is partnering with UK Research and Innovation (UKRI) in the United Kingdom to fund a ***Bilateral US-UK Workshop on Quantum Information Science in Chemistry*** co-organized by Greg Scholes (Princeton U) and Alexandra Olaya-Castro (University College London) in 2024. Stay tuned for more details.

In the important areas of outreach and broadening participation, the CHE-team has been very active. CHE sent contingents to both the Fall and Spring 2023 National ACS meetings as well as to the joint Midwest/Great Lakes and Southwest Regional ACS meetings. This Fall, CHE had a big presence at the 50<sup>th</sup> Anniversary NOBCChE (National Organization for the Professional Advancement of Black Chemists and Chemical Engineers) meeting in New Orleans and sent team members to the SACNAS (Society for the Advancement of Chicanos/Hispanics and Native Americans in Science) and HACU (Hispanic Association of Colleges and Universities) meetings in Portland and Chicago, respectively. Our NSF-CHE teammates came back energized by the vibrant atmosphere at all three meetings with great attendance by early career scientists. The future of the STEM workforce is bright!

CHE has also been very active in new NSF Mathematical and Physical Sciences (MPS) Directorate initiatives directed at achieving excellence through diversity. These include the Ascend postdoctoral fellowships mechanism and the Launching Early-Career Academic Pathways (LEAPS) early career research initiation grants, each in their third year, as well as the MPS-High supplement designed to help bring high school students into the research lab in the summer. And the largest scale new mechanism is the PREC (Partnerships for Research & Education in Chemistry) program that funds an MSI directly to partner with one the large center grant teams under CHE. Last year, we funded the first ever group of PREC recipients; namely Cal State-LA (Track 1; partnering with MolSSI led by VA Tech); U New Mexico (Track 1; partnering with the CGEM CCI led by UC-Berkeley); and Clark-Atlanta (Track 2; partnering with the CSP CCI led by U Minnesota). This program has proven so popular with both MSI Chemistry Departments and our centers program that we stood up a new PREC planning grant mechanism this year and made an additional six such awards to Cal State Fullerton (CCAS); UC Merced (CSOE and MolSSI); UTEP (CSOE); Morehouse (MONET) and Howard U (ChemMatCars). The potential for active collaboration and intellectual cross-pollination is high as these PREC partnerships grow and evolve.

Wishing you all a successful partnership, to the end of 2023 and an auspicious beginning as we embark upon 2024!

Regards,

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**David B. 'Dave' Berkowitz**  
Division Director

## WELCOME TO OUR NEW PROGRAM DIRECTORS!

**DR. C. MICHAEL GREENLIEF**

Dr. Michael Greenlief is Associate Professor of Chemistry and Director of MU NMR and Chemistry Mass Spectrometry Facilities at the University of Missouri. His research interests include the

development of mass spectrometry-based methods to determine bioactive components in dietary botanical supplements and to quantitatively measure metabolites in a variety of matrices. He is also interested in examining biological systems at the protein level using label-free quantitative proteomics. He joins the Division as a Program Director in the Major Research Instrumentation (MRI) Program.

**DR. JOHN JEWETT**

Dr. John Jewett is Associate Professor in the Chemistry and Biochemistry Department at the University of Arizona. Dr. Jewett specializes in bioorganic, chemical biology, synthesis/synthetic methods,

and development. He has joined the Chemistry of Life Processes (CLP) Program as a Program Director.

**DR. GANG-YU LIU**

Dr. Gang-Yu Liu is Professor of Chemistry at the University of California, Davis. Her research focuses on the development of nanotechnology and potential applications to bioanalytical chemistry.

Dr. Liu has joined the Division as a Program Director in the Macromolecular, Supramolecular, Nanochemistry (MSN) Program.

**DR. PUMTIWITT MCCARTHY**

Dr. Pumtiwitt McCarthy is Associate Professor of Chemistry at Morgan State University and served as Interim Chairperson of the Chemistry Department from 2021-2023. Her

research investigates the carbohydrate-producing enzymes from bacterial pathogens as potential synthetic tools for vaccine production and bioremediation applications. She joins the Division as a Program Director in the Chemistry of Life Processes (CLP) and Broadening Participation (BP) Programs.

**DR. SARAH WENGRYNIUK**

Dr. Sarah Wengryniuk is Associate Professor of Chemistry at Temple University in Philadelphia. Her research interests center on the development of sustainable, reversed-polarity methods for the rapid generation of

molecular complexity. This includes specific efforts in hypervalent iodine chemistry, electrochemistry, and earth abundant metal catalysis. She joins the Division as a Program Director in the Chemical Synthesis (SYN) and Chemical Catalysis (CAT) Programs.

## FAREWELL TO DEPARTING PROGRAM DIRECTORS AND ADMINISTRATIVE STAFF

**DR. PAUL BLAKEMORE**

Dr. Blakemore returned to Oregon State University to continue his research. He was a Program Director in the Chemical Catalysis (CAT) and Chemical Synthesis (SYN) Programs.

**DR. MICHELLE BUSHEY**

Dr. Bushey retired after years serving NSF/CHE, first in Chemical Measurement and Imaging (CMI) and Research Experience for Undergraduates (REU) programs, then the Centers for Chemical Innovation (CCI) Program. She also served as the Acting Deputy Division Director for MPS/CHE between March 5, 2021 and July 3, 2021 and as Staff Associate at the MPS Office of Assistant Director (OAD) in 2021-2023. Dr. Bushey has been a strong advocate for workforce development and broadening participation, spearheading two important solicitations (MPS-LEAPS and MPS-ASCEND) when she was at MPS/OAD.

**DR. AMANDA HAES**

Dr. Haes completed her rotation and returned to University of Iowa by the end of December. When she was at NSF/CHE, she worked in the CSDM-A, CMI, MSN, and MRI programs at different times. She also co-led the NSF effort overseeing the Critical Aspects of Sustainability metaprogram.

**DR. GEORGE JANINI**

Dr. Janini retired after years serving NSF/CHE, first in Analytical and Surface Chemistry Program (now Chemical Measurement and Imaging Program), then the Macromolecular, Supramolecular, Nanochemistry (MSN) Program and with shorter periods in other Disciplinary Research Programs (DRPs). Dr. Janini has also been the managing PD and a strong advocate for CHE's investment in NNCI (National Nanotechnology Coordinated Infrastructure) and FuSe (Future of Semiconductors) activities.

**DR. JORGE LAMBOY-GONZALEZ**

Dr. Lamboy-Gonzalez joined the Division as an AAAS Science and Technology Policy Fellow, during which time he supported the Molecular Foundations for Biotechnology (MFB) Program and the Broadening Participation activities in the Agency.

**MS. VALERIE MAIZEL**

Ms. Maizel has moved to the Division of Astronomical Sciences as a Program Specialist. Ms. Maizel worked as Program Specialist in CHE since 2022, supporting SYN, CSDM-A, and CCI programs. She has also led the Division's teambuilding efforts in the past few years. Congratulations on your promotion and new opportunity.

The CHE Division thanks these colleagues for their hard work and dedication to the community and to the Division! We also thank Drs. Janini and Bushey for their years of dedication and support in many programs and initiatives.

**An updated [staff list](#) is available at the end of this newsletter and on the CHE webpage.**

**DR. PABLO SOBRADO**

Dr. Sobrado worked in the Chemistry of Life Processes (CLP) and the Research Experiences for Undergraduate Programs in Chemistry (REU) Program. He resumes his activities as a Professor at Virginia Tech.

**NSF ROTATOR PROGRAM:**

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 the research community, manage proposal reviews, 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 from a multi-disciplinary perspective, 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 and Development program. The Division of Chemistry is constantly looking for program directors with experience in different fields of chemistry.

Most rotators join in the Fall, but other start dates are possible - it is not too early to think about next year! Is Fall, 2024 the right time 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](#) on our Divisional website ([https://www.nsf.gov/publications/vacancy.jsp?org=CHE&nsf\\_org=CHE](https://www.nsf.gov/publications/vacancy.jsp?org=CHE&nsf_org=CHE)) for information on how to apply, or visit the [NSF Careers home page](#) (<https://beta.nsf.gov/careers/openings/mps/che/che-2021-8581>) for more information on being a rotator.

## FY 2023 MAJOR CHE INVESTMENTS

### A. CENTERS FOR CHEMICAL INNOVATION (CCI) PHASE II AND PHASE I AWARDS

The NSF Center for the Mechanical Control of Chemistry (CMCC) is the newest major research phase II center supported by the NSF Division of Chemistry. CMCC is seeking a fundamental understanding of the ways that mechanical force can drive chemical reactions. CMCC is a multidisciplinary, multi-institutional center led by James Batteas at Texas A&M University. You can learn more about the people, research, and broader impacts of CMCC at their website: <https://www.chem.tamu.edu/cmcc>. Press releases are also available from [NSF](#) and [Texas A&M](#).

Currently there are six other active phase II Centers for Chemical Innovation (CCIs), covering a wide range of chemical topics. Each Phase II CCI receives \$4 million per year. You can see the entire portfolio (including the centers that have completed their funding cycle) at <https://www.nsfcci.org>.

These major research centers are built in stages. Teams receive Phase I support (\$600,000/yr. for three years) to conduct key research projects, build their team, and develop their best case for a compelling research center. Three teams started Phase I awards in September 2023:

- **CHE-2317582**: NSF Center for Polymers for a Circular Economy, led by Chuanbing Tang, University of South Carolina at Columbia
- **CHE-2318105**: NSF Center for MXenes Synthesis, Tunability and Reactivity, led by Dmitri Talapin, University of Chicago
- **CHE-2318141**: NSF Center for Sustainable Photoredox Catalysis, led by Garret Miyake, Colorado State University

There are many opportunities for members of the NSF Chemistry community to contribute to the CCI Program by reviewing proposals or evaluating the progress of these centers. If you are interested in serving as a reviewer, panelist, or site visitor, please send an email to Dr. Katharine Covert ([kcovert@nsf.gov](mailto:kcovert@nsf.gov)) with your interest and expertise.

### B. SUSTAINABLE CHEMISTRY

Over the past year, CHE considered proposals that were submitted in response to the **Critical Aspects of Sustainability (CAS): Innovative Solutions to Sustainable Chemistry (CAS-SC) Dear Colleague Letter** (NSF 22-111). The CAS-SC Program recognizes the importance of sustainable chemistry in addressing many societal challenges and aims to encourage the expansion of the Nation's research capacity in this topic area through submissions of research proposals. The intellectual merit of successful projects contained a compelling, detailed, and quantitatively supported description of how the proposed research would address sustainable chemistry. The CHE Division supported eight awards in FY23 that align with CAS-SC goals. Projects were supported through the CAT, CSDM-A, and SYN disciplinary research programs. One such award was led by Professors Alan Goldman of Rutgers University, Patrick Holland of Yale University, and Alexander Miller of the University of North Carolina at Chapel Hill who are supported by CAT to study the principles of electrochemical conversion of atmospheric nitrogen (N<sub>2</sub>) to ammonia (NH<sub>3</sub>) using molecular catalysts (**CHE-2247257/2247258/2247259**). The research will establish a foundation for efforts to discover sustainable alternatives to replace current fossil fuel-based routes to ammonia to improve fertilizer production as well as the storage and transportation of renewably produced energy, for direct use as fuel for electric utilities or transportation or for conversion to hydrogen.

### C. MOLECULAR FOUNDATIONS FOR BIOTECHNOLOGY (MFB)

The Molecular Foundations for Biotechnology (MFB) is an initiative started by the Chemistry Division to spur and support innovative and interdisciplinary research that helps maintain this country's leadership in biotechnology. The 2023 MFB solicitation (**NSF 23-554**) focused on projects that develop and provide proof-of-concept around one or both of the following themes: 1) tools, methodologies, and/or theories to elucidate RNA structure and/or function and 2) RNA as innovative biomolecular tools. The Chemistry Division this year partnered with several programs, divisions, and directorates across NSF, including the Molecular Genetics program in the Molecular and

Cellular Biosciences Division of the Biosciences Directorate, the Division of Mathematical Sciences and the Physics of Living Systems Program in the Division of Physics in the Mathematical and Physical Sciences Directorate, and the Information and Intelligent Systems Division of the Computer and Information Sciences and Engineering Directorate for the MFB solicitation. In addition, NSF engaged with the National Human Genome Research Institute of the National Institutes of Health to help support this year's initiative. The two thematic areas generated significant interest from the research community, resulting in over 90 unique project proposals that cut across a wide swath of experimental and/or computational approaches that develop tools to study RNA and/or developing RNA itself as a tool. New awards will be announced soon.

#### D. QUANTUM INFORMATION SCIENCE AND ENGINEERING (QISE)

Information on awards for Quantum Sensing Challenges for Transformational Advances in Quantum Systems (QuSeC-TAQs) is available via this link: <https://new.nsf.gov/news/quantum-scale-sensors-lead-human-scale-benefits>. This NSF-wide program supports interdisciplinary teams of three or more investigators to explore highly innovative, original, and potentially transformative research on quantum sensing. Chemists are active participants in several funded projects, including acting in the role of principal investigators. In [NSF 2326801](#), Professor Benjamin King (University of Nevada) and his team focuses on the development of quantum sensors with helium-4 using 2D materials. This project combines two exotic materials, superfluid helium and nanoporous two-dimensional polymers, to develop a sensor device that takes advantage of the unusual macroscopic quantum behavior of liquid helium at temperatures near absolute zero. In [NSF 2326837](#), Professor Joseph M. Zadrozny (Colorado State University) and his team are studying noise engineering for enhanced quantum sensing. This project will explore electronic noise at the quantum scale and how to control it by molecular design. In [NSF 2326838](#), Professor Ashok Ajoy (University of California - Berkeley) and his team will develop designer quantum sensor platforms based on "hyperpolarized" nuclear spins in metal-organic framework (MOF)s. This bottom-up approach leverages the ability of MOFs to maintain atomically precise 3D arrays of quantum sensors, with fine synthetic control of sensor spacing, crystal topology, enrichment, and inter-sensor coupling. In [NSF 2326840](#), Professor Prineha Narang (University of California - Los Angeles) and her team seek to develop and demonstrate a quantum sensing platform that features an in situ distributed sensor network to measure and understand atmospheric chemistries and climate variables.

#### E. HELIUM RECYCLING SYSTEM AWARDS

A worldwide shortage of helium and associated escalating costs are adversely impacting research in a wide range of ways. One major impact is on the operation of research facilities using liquid helium to cool superconducting magnets in magnetic and cyclotron resonance instrumentation. Recognizing this community concern and the associated risk of facility shut-downs, the NSF Biosciences Directorate (BIO) and Chemistry Division (CHE) jointly issued a Dear Colleague Letter (DCL [NSF 22-088](#)) on May 24, 2022, inviting proposals for acquisition of helium recycling and liquefaction equipment. A flurry of submissions were received by the deadline. This clearly is a community pain point!

As the shortage drew more attention, it found its way into the CHIPS and Science Act (signed into law on August 9, 2022), which called for the NSF Major Research Instrumentation Program (MRI) to address the challenge. In response, MRI introduced a new "Track 3" for helium recovery equipment when they released the latest version of their solicitation ([NSF 23-519](#)) on November 23, 2022. The Chemistry Division decided to "fast-track" review of the October proposals, both to initiate helium savings as soon as possible, and to provide unsuccessful PIs time to utilize reviewer feedback in responding to the MRI Track 3 opportunity (for which proposals were due February 21, 2023). Within about 7 weeks of submission, proposals were reviewed carefully, and award recommendations were made. With co-funding from the Division of Molecular and Cellular Bioscience in BIO and from the Established Program to Stimulate Competitive Research (EPSCoR), a total investment in the seven awards (6 CHE, 1 DBI) was made for nearly \$2.3M — a good head start towards the aims outlined in the CHIPS and Science Act. Click [here](#) for a list of awards.

#### F. NASEM STUDY ON QIS

The Division of Chemistry co-sponsored [NSF 2117300](#), a National Academies of Sciences, Engineering, and Medicine (NASEM) study with the Department of Energy aimed at identifying opportunities at the interface of chemistry and



quantum information science (QIS). The study was led by Professor Theodore Goodson of the University of Michigan, and the committee of 15 distinguished scientists published a report outlining their recommendations. More information and a copy of the report can be found at: <https://www.nationalacademies.org/our-work/identifying-opportunities-at-the-interface-of-chemistry-and-quantum-information-science#sectionPastEvents>.

### G. UNIVERSITY INDUSTRY DEMONSTRATION PARTNERSHIP (UIDP) WORKSHOP AND ITS REPORT

With support from [NSF 2236626](#), UIDP convened a workshop on “Aligning Interests in Support of Chemistry Research” held Nov. 9-10, 2022, in Washington, DC. The participants included representatives from academia with experience conducting industry-funded research as well as industry representatives with programmatic responsibilities for sponsored research and the ability to take part in a co-investment program with a government agency.

The event co-chairs were Peter Dorhout (Vice President of Research at Iowa State University), and Lee Ellen Drechsler (Senior Vice President at Procter & Gamble), who, along with Pete Ellingson (Open Innovation Manager at Procter & Gamble), were integral in providing programmatic guidance and identifying and securing a strategic set of academic and corporate participants. Chemical companies have a significant track record of engaging institutions of higher education through internships, facility access and use, co-location of research personnel, and industry-sponsored research projects. Concurrently, NSF is investing significant resources to explore ways to increase industry co-investments in areas of mutual interest. In recent years, NSF and other government agencies have partnered with companies to co-develop and co-fund calls for research proposals from academic researchers through joint solicitations. **Please see the full report here:** <https://uidp.org/custom-type/chemistry-workshop-report/#disclaimer-21436>.

## FY 2024 NEW AND CONTINUING FUNDING OPPORTUNITIES

### A. CRITICAL ASPECTS OF SUSTAINABILITY (CAS) DCLS

Sustainability is a long-standing interest of the chemistry community and a growing national priority. In response, the “Critical Aspects of Sustainability” (CAS) metaprogram (<https://beta.nsf.gov/funding/opportunities/critical-aspects-sustainability-cas>), which seeks to support basic research through core disciplinary programs, continuously supports three Dear Colleague Letters (DCLs) that are of interest to chemists in the past three years. Investments in these topics are made in response to disciplinary, EAGER, RAISE, and workshop proposals. We continuously welcome proposals submitted in response to these DCLs in FY24; please read the funding opportunities carefully and reach out to managing PDs for more information:

- **[NSF 20-050 Dear Colleague Letter: Critical Aspects of Sustainability \(CAS\): Micro- and Nanoplastics \(MNP\)](#)** focuses on the sustainability of plastics including recyclability, waste reduction, and environmental impacts (<https://www.nsf.gov/pubs/2020/nsf20050/nsf20050.jsp>).
- **[NSF 21-124 Dear Colleague Letter: Critical Aspects of Sustainability \(CAS\): Innovative Solutions to Climate Change](#)** encourages the science and engineering communities to develop forward-thinking research that will demonstrably aid in the Nation's goal of reaching net-zero greenhouse gas (GHG) emissions and developing approaches for adapting to the change that is already occurring (<https://www.nsf.gov/pubs/2021/nsf21124/nsf21124.jsp>).

- **NSF 22-111 Dear Colleague Letter: Critical Aspects of Sustainability (CAS): Innovative Solutions to Sustainable Chemistry** establishes a new program focused on the importance of sustainable chemistry in addressing many societal challenges and aims to encourage the expansion of the Nation's research capacity in this topic area. Proposals that emphasize a detailed and quantitative understanding of sustainable chemistry and include industrial partnerships are of particular interest (<https://www.nsf.gov/pubs/2022/nsf22111/nsf22111.jsp>).

See recent awards via the NSF Award Database at <https://nsf.gov/awardsearch/advancedSearch.jsp>. Search for "CHE-Division of Chemistry" under NSF Organization and "CAS-MNP", "CAS-Climate", or "CAS-SC" as keywords.

## B. NSF-BINATIONAL SCIENCE FOUNDATION (BSF) PARTNERSHIP

The Binational Science Foundation (BSF) was founded in 1972, <https://www.bsf.org.il>. Its mission is to support basic research collaboration between US and Israel in a wide range of fields and disciplines. Over the years, the NSF-BSF partnership has become one of the NSF's largest international collaboration programs, including 7 NSF directorates (BIO, CISE, EDU, ENG, GEO, MPS and SBE), 20 NSF divisions and over 100 NSF programs. **Effective in FY 2024**, all 9 CHE Disciplinary Research Programs will accept NSF-BSF proposals within their respective submission windows, as described in the Disciplinary Research Programs (DRP) solicitations ([NSF 22-605](#) and [22-606](#)). NSF-BSF proposals are reviewed within NSF, following standard NSF review and award recommendation processes. If awarded, the US and Israeli researchers are funded separately by NSF and BSF, respectively. Interested US researchers can apply following guidelines in the NSF-BSF DCL ([NSF 20-094](#)).

## NO DEADLINE PILOT FOR DISCIPLINARY RESEARCH PROGRAMS (CSDM-A, CLP, CTMC)

For FY 2024, the Division of Chemistry will continue the pilot study of the impact of the removal of deadlines for the submission of proposals to the CLP, CSDM-A and CTMC programs. Since September 1, 2022, proposals to these three programs can be submitted at any time.

The no-deadline pilot seeks to assess the benefits and challenges of removing deadlines in proposal submission for the chemistry research community. The removal of deadlines on proposal submission is intended to allow PIs more flexibility and better facilitate interdisciplinary research. It may, however, have unanticipated consequences for PIs, reviewers, and institutions. We intend to continue to collect information through this pilot to further assess the potential impacts to the CHE PIs, their institutions, the reviewer community, and the Division operation.

For more information about the NSF/CHE No-Deadline Pilot, please see the [NSF solicitation 22-606](#). We encourage you to share your experience and your feedback about this pilot. Please send us your thoughts at [cheminfo@nsf.gov](mailto:cheminfo@nsf.gov).

For specific questions to No-Deadline Pilot participating programs, please contact:

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For CTMC: Dr. Richard Dawes, [rdawes@nsf.gov](mailto:rdawes@nsf.gov)

For CLP: Dr. Christine Chow, [cchow@nsf.gov](mailto:cchow@nsf.gov)

## FY 2023 AND 2024 DIVISION OUTREACH EFFORTS

### A. 2023 NSF CHEMISTRY EARLY CAREER INVESTIGATOR WORKSHOP

The CHE Division sponsored (CHE [2313407](https://www.nsfcareerworkshop.com)) an in-person NSF-CHE Early Career Investigator Workshop on May 22-23, 2023, in Alexandria, VA: <https://www.nsfcareerworkshop.com>.

The workshop was led by Corinna Schindler (University of Michigan) and Osvaldo Gutierrez (Texas A&M University) and included approximately 75 assistant professors from around the country, 14 workshop mentors from the community, and approximately 25 program directors from around NSF (CHE, MCB, and CBET), NIH, DOE, and ACS PRF. There were wide-ranging discussions in both full group and break-out session formats. Thanks to all who participated and contributed to making this a highly interactive and successful event. Look out for information about our 2024 Early Career Workshop, which will be held in Alexandria, VA.



*Participants in the 2023 NSF CHE Early Career Workshop.*

### B. CHE AT THE 2023 AMERICAN CHEMICAL SOCIETY NATIONAL MEETINGS IN INDIANAPOLIS (SPRING MEETING) AND SAN FRANCISCO (FALL MEETING)

This year's Spring and Fall National ACS meetings were hybrid events, and CHE's regular Federal Funders Townhall event followed suit. As CHE and several NSF partners presented the latest funding opportunities and priorities in person, they were joined virtually by Gail McLean from the Department of Energy (DOE), Office of Basic Energy Science, Chemical Sciences, Geosciences and Biosciences Division; Michael Berman from the Air Force Office of Scientific Research, Molecular Dynamics and Theoretical Chemistry Program; and Jiong Yang from the National Institute of General Medical Sciences (NIGMS) at the spring meeting. The most recent Fall 2023 event in San Francisco featured CHE Division Director David Berkowitz, MPS/DMR Program Director John Schlueter, Kadir Aslan from NIGMS, Scott Siegel from the Dreyfus Foundation and Nancy Jensen from ACS PRF speaking from the podium in person and Gail McLean from DOE joining in remotely.



*Dr. David Berkowitz giving a presentation at the ACS meeting in San Francisco.*

### C. AWESOME CON

CHE participated in an outreach event entitled "Awesome Con". This was an event in celebration of geek culture with entertainment stars of movies and TV, and over 70,000 kids and adults in attendance.



*CHE participated in a shared exhibitor booth with hands on demonstrations, posters, and collectibles. There was also a live stage with ongoing interactive chemistry experiments with audience participation.*



#### D. NATIONAL ORGANIZATION FOR THE PROFESSIONAL ADVANCEMENT OF BLACK CHEMISTS AND CHEMICAL ENGINEERS (NOBCCHE) CONFERENCE

The 2023 NOBCCHE Conference was held in New Orleans, Louisiana, on September 11-14, 2023. The NSF Division of Chemistry participated on-site this year, along with colleagues from Divisions of Chemical, Bioengineering, Environmental, and Transport Systems (ENG-CBET) and Human Resource Development (EHR-HRD, now EDU-EES). We hosted “Conversations with the NSF”, Speed Coaching, and an NSF booth in the exhibitor hall to discuss information about NSF-wide funding opportunities.



*Dr. Korie Grayson, Dr. Kenneth Carter, Dr. Tomislav Pintauer, Dr. Samy El-Shall, Dr. Tanya Whitmer, Dr. Sierra Jackson, Mr. Darren Kimble, and Dr. George Richter-Addo.*

#### E. TENNESSEE TECH UNIVERSITY/FISK UNIVERSITY/VANDERBILT UNIVERSITY/UNIVERSITY OF TENNESSEE — OPPORTUNITY FOR OUTREACH VISITS

The Chemistry Division has a standing offer to provide virtual or in-person departmental visits as a means of enhancing communication about NSF opportunities and policies in an environment more targeted and less hectic than a national meeting. Although in-person visits were precluded by the pandemic, they are beginning to make a comeback. The Division bears all associated travel costs. We have had a small but steady stream of requests; given limitations on our travel budgets, we like to parlay the requests to serve as much of the community as we can. A recent example was spurred by a request from Tennessee Tech (TTU), for which completion of a new facility has coincided with expansion of its Chemistry faculty. NSF CHE was happy to receive TTU’s request for a program officer visit to help inform their new colleagues and leveraged that request to offer parallel visits to other regional programs. In the end, the TTU visit was preceded by visits with Fisk and Vanderbilt faculty in Nashville, and faculty and administrators at the University of Tennessee – Knoxville. Each site made its own determination of the target audience, and the visitor’s time was apportioned between open sessions, formal presentations, and one-on-one meetings as the host preferred. Given the dynamics of NSF programs and opportunities, we perceived value to all involved. Feel free to reach out to the Division if your department is interested in a similar opportunity — especially if you are willing to host and arrange involvement from other nearby universities.

## F. DIVISION VIRTUAL OFFICE HOURS — SPECIAL TOPICS THROUGHOUT THE YEAR

In FY 2023 we continued the virtual office hours initiated in response to the pandemic. In addition to discussions on new funding opportunities and broadening participation topics, we also started a series of office hours on the funding scope and portfolios of our core disciplinary research programs.

Slides from many of these presentations are posted on the [Division Office Hour webpage](#).

Based on the community input during our recent survey about the time and topics, future Division Office Hour sessions will be held from 3-4pm (instead of 4-5pm) on Fridays. Below is the tentative schedule for FY 2024 CHE Division Office Hour Topics:

PROGRAM	HOST	DATE (3-4pm, Eastern Time)
CTMC	Richard Dawes ( <a href="mailto:rdawes@nsf.gov">rdawes@nsf.gov</a> )	1/26/2024
SYN	George Richter-Addo ( <a href="mailto:griechter@nsf.gov">griechter@nsf.gov</a> )	2/23/2024
CSDM-A	John Papanikolas ( <a href="mailto:jpapanik@nsf.gov">jpapanik@nsf.gov</a> )	3/29/2024
CAT	Ken Moloy ( <a href="mailto:kmoloy@nsf.gov">kmoloy@nsf.gov</a> )	4/19/2024
CSDM-B	Tingyu Li ( <a href="mailto:tli@nsf.gov">tli@nsf.gov</a> )	5/10/2024
REU	Tomislav Pintauer ( <a href="mailto:tompinta@nsf.gov">tompinta@nsf.gov</a> )	6/7/2024
CCI	Kathy Covert ( <a href="mailto:kcovert@nsf.gov">kcovert@nsf.gov</a> )	6/28/2024
CMI	Kelsey Cook ( <a href="mailto:kcook@nsf.gov">kcook@nsf.gov</a> )	7/19/2024
MSN	Suk-Wah Tam-Chang ( <a href="mailto:stamchan@nsf.gov">stamchan@nsf.gov</a> )	8/16/2024
MRI	Tanya Whitmer ( <a href="mailto:twhitmer@nsf.gov">twhitmer@nsf.gov</a> )	9/20/2024
CLP	Catalina Achim ( <a href="mailto:cachim@nsf.gov">cachim@nsf.gov</a> )	10/25/2024
BP Prog and BPDEI WG	Anne-Marie Schmoltner ( <a href="mailto:aschmolt@nsf.gov">aschmolt@nsf.gov</a> )	11/15/2024
ECS	Anne-Marie Schmoltner ( <a href="mailto:aschmolt@nsf.gov">aschmolt@nsf.gov</a> )	12/6/2024

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## DIVISION OF CHEMISTRY

*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.*

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