



# CHE NEWSLETTER

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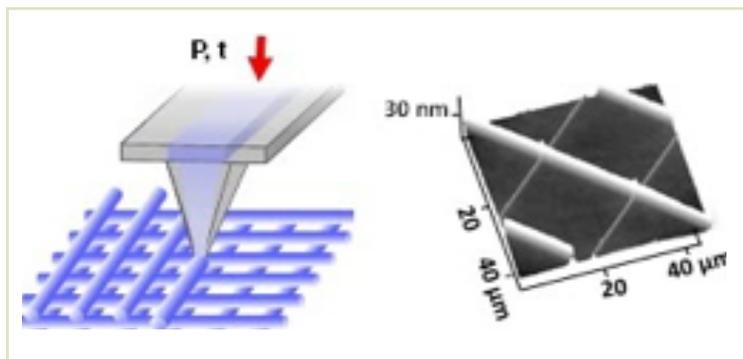
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A schematic diagram of 3D nanoprining using a microfluidic probe following custom designed structures (left) and a 3D view of an AFM topographic image showing a small portion of the 3D structure (right).

## 3D NANOPRINTING USING A MICROFLUIDIC PROBE

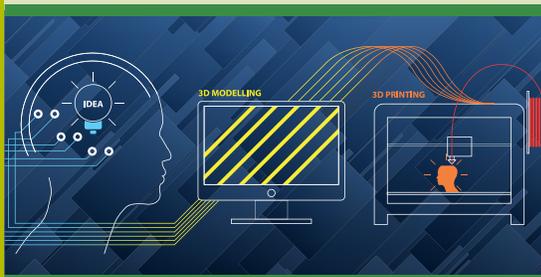
Recent leaps in technology have made 3D printing a go-to fabrication method for a huge array of products, from rocket engines to vehicle parts and model toys. Despite macroscale advances, printing accurately at the nanoscale, in all three dimensions, remains a challenge. To gain nanosized printing resolution with different materials, Professor Gang-yu Liu at the University of California, Davis, turned to scanning probe microscopy based technology.

In one method, published in *ACS Nano*, **2016**, *10*, 5656–5662, Liu's group adopts a layer-by-layer, tip-guided deposition. Starting with an atomic force microscopy (AFM) tip coated by polyelectrolyte complexes, the tip is brought near the surface and the complex is transferred following the tip's trajectory. Examining material formulations and nanoscale droplet-surface interactions, the group ultimately printed 3D structures with nanometer scale precision.

To enable 3D nanoprining that accommodates a wide range of materials, Liu teamed up with Cytosurge Corp. They developed a direct printing technique using microfluidic AFM probes, each containing a microtunnel opening at the top of the tip. Published in *J. Phys. Chem. B*, **2018**, *122*, 956-962, they demonstrated that polymeric materials, like a mixture of methacrylate esters, can be directly printed in custom designs. In the figure above, three-layered stacking grids were printed with inter-layer alignment of 4.8 nm over a 1 mm field. Liu's group continues to investigate ways to optimize the material formulation and printing conditions to further scale-down the size of printed features. This award was supported by the Macromolecular, Supramolecular and Nanochemistry Program as CHE-1808829.

## CHE COMMUNICATION LISTSERV SIGN-UP

Stay informed with the latest news and topics of interest from the NSF Division of Chemistry: sign up for our mailing list by sending an email message with the subject line, 'Subscribe to CHE', to: [cheminfo@nsf.gov](mailto:cheminfo@nsf.gov). Please share this information with your colleagues!





## UPDATE FROM THE DIVISION DIRECTOR

Dear Colleagues,

My tenure as Director of the NSF Division of Chemistry is coming to an end on July 31, 2018 and I will be returning to Michigan State University (MSU) in the fall. While I look forward to being at MSU and focusing more fully on my theoretical/physical chemistry research, I will certainly miss my time at NSF, and will look back at it with a great deal of appreciation.

In this last column, I highlight a few activities during my time at NSF, as well as some opportunities and a few final thoughts.

**Budgets:** This has been a very challenging, yet exciting time to be at NSF. On March 23, 2018, the President signed into law the omnibus appropriations bill that funds the federal government for the rest of fiscal year (FY) 2018, which ends on Sept. 30, 2018. The House passed the measure by a vote of 256 to 167 on Mar. 22, and Senate approval came early the next day in a 65-to-32 vote.

The Consolidated Appropriations Act of 2018, (Public Law 115-141) provides \$1.3 trillion to fund the federal government, including \$7.8 billion for NSF, an increase of \$300 million over the FY 17 appropriation. The law funds NSF appropriations accounts as follows:

- Research and Related Activities (R&RA) — \$6,334 million (up from \$6,006 million in FY 17 Actual)
- Education and Human Resources (EHR) — \$902 million (up from \$873 million in FY 17 Actual)
- Major Research Equipment and Facilities Construction (MREFC) — \$183 million (down from \$223 million in FY 17 Actual)
- Agency Operations and Award Management (AOAM) — \$329 million (down from \$382 million in FY 17 Actual)
- National Science Board (NSB) — \$4 million (same as FY 17)
- Office of Inspector General (OIG) — \$15 million (same as FY 17)

(These numbers may not add up due to rounding. Source: [https://www.nsf.gov/about/congress/115/highlights/cu18\\_0329.jsp](https://www.nsf.gov/about/congress/115/highlights/cu18_0329.jsp))

We are currently (as of June 20, 2018), awaiting final approval on our appropriations.

Information on the status of the NSF and Divisional Budgets and other funding initiatives may be found on NSF's webpages, see: <https://www.nsf.gov/about/congress>. I encourage you to visit the site often.

**Activities:** During my time at NSF, we have begun a number of areas of new emphasis including our Data-Driven Discovery Science in Chemistry (D3SC) initiative, and initiatives in areas such as for the Rules of Life and Quantum Leap, which tie to NSF's Ten Big Ideas. These opportunities, have been driven, in part, by several conferences held by CHE during my early days at NSF. We have also made a concerted effort to offer the Centers for Chemical Innovation Phase I program each year. I certainly understand the challenges of putting together such an effort, and believe that, when possible, it is important to provide the community with ongoing, regular opportunities to put their best collaborative efforts forward.

We have now held three Career workshops to aid junior faculty in chemistry in grant proposal preparation, and had approximately one hundred participants at each workshop. Meeting so many new chemistry faculty members from universities all over our country was certainly one of the high points of my time at NSF. The energy and enthusiasm of these junior faculty, and, most importantly, the exciting science in which they have interest, was truly inspirational. CHE has been engaged in enhancing communications opportunities with the chemistry community including utilizing Twitter and Tumblr for communication, holding a Presidential Symposium at the National Meeting of the American Chemical Society (ACS) to solicit interest in a number of NSF initiatives, and presenting an ACS Webinar. We thank Ted Goodson and Cynthia Burrows for sharing their NSF CHE-funded research in this webinar and how it ties to the NSF Ten Big Ideas and we thank the American Chemical Society for their sponsorship and organization. We expanded our ACS National Meeting Town Hall Meeting to include not just federal funders, but private foundations and companies in order to provide the community with a variety of possible routes for funding their research. We have also participated in the annual meetings for the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (NOBCCHE) and the Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS).

**Opportunities:** The Division of Chemistry has a **new** solicitation, and **all** new proposals to the individual investigator program for the September and October submission windows must be submitted in response to this solicitation. While, overall, there are very few changes from the standard NSF proposal preparation requirements, there are a few important ones, and the third will be the most impactful. In summary, the changes are:

- 1) for each current and pending proposal, NSF requests a brief description of the relationship of the present proposal to currently funded or pending proposals;
- 2) the addition of a single copy document is required for resubmissions to explain the changes to a revised proposal; and
- 3) there is a limitation in the number of proposals submitted to the September/October window. **A proposer may only submit one proposal as a PI, co-PI, or Senior Personnel per fiscal year.** Many PIs have correctly understood that only one proposal is submitted to the CHE core programs each year. However, the numbers of PIs submitting multiple proposals in the core programs in a single year is on the rise, with some PIs submitting several proposals to the program. As we want to provide a level playing field for the chemistry community as well as maintain a manageable workload and funding rate, we have implemented this change for this upcoming September/October submission windows. **Please be sure to submit in response to the new solicitation** and not to the *Proposal & Award Policies & Procedures Guide (PAPPG)*.

**Big Ideas:** As NSF begins to invest more heavily in some of the NSF Big Ideas, please visit the NSF websites, including the CHE Division website to find new funding and conferences/Ideas Labs opportunities. Many new funding opportunities have appeared over the past several months, and opportunities will continue to emerge. You are allowed to submit to these additional solicitations **in addition to** the core CHE programs.

**Leadership of the Division of Chemistry:** The search process at NSF is akin to the search process at many universities. There are many complexities, so the process takes some time. A number of outstanding candidates have been interviewed, and a decision for my successor will be made shortly. I am very excited about the prospects, and am confident that CHE will have an outstanding leader. Meanwhile, the Division will be led by an Acting Division Director until the new Division Director can arrive.

**New NSF Director of Operations:** Please join me in congratulating chemist Fleming Crim, Professor Emeritus at the University of Wisconsin who rejoins NSF on July 1, 2018 as the Chief Operating Officer (COO). Fleming previously served as the Assistant Director for the Directorate for Mathematical and Physical Sciences at NSF.

**Final Thoughts:** Though I have “bragged” about the NSF CHE staff in the past, I cannot help but to do this again. The staff is an amazing group, and I so very much appreciate the opportunity to have worked with them. The scientific staff have an amazing level of breadth and depth, and have their pulse on exciting scientific opportunities and directions. They wrestle with every recommendation, do their best to fund as many proposals as possible, and go out of their way to leverage additional funding from other sources to support proposals. They are tireless, and always are willing to participate actively in last-minute opportunities to try to pursue additional funding for the chemistry community. The administrative staff and leadership are a group of consummate professionals who are engaged through all of the stages of the proposal process, and help the division in so many other ways as well. I will miss all the staff greatly! Such levels of breadth and depth and professionalism are found throughout NSF, and I have benefitted from my interactions with so many people – far too many to name, not only within NSF, but also at other federal agencies.

As I have mentioned previously, each year, there are opportunities to come to NSF for rotator positions. NSF has an opportunity for new rotators – scientists who come to NSF for short-term (1-4 year) positions from their universities or other institutions or industry – I encourage you to consider the opportunity to spend some time at NSF. Each year, we look for a different special “niche” to fit into our programs. If you think that you might have interest in coming to NSF within the next few years, please let us know. An opportunity that matches your background may come up right after you apply; or, it may not come up until a number of years later. There are also multiple divisions or directorates that might match with your interests, whether education, molecular biology, physics, materials sciences, chemical engineering, or some other areas.

I very much look forward to seeing you at upcoming meetings such as the National Meeting of the American Chemical Society in Boston, and to engaging with you in other ways as we cross paths.

Sincerely,

**Angela K. Wilson**  
Division Director, CHE

## NEW CHE DISCIPLINARY RESEARCH PROGRAMS SOLICITATION (CHE-DRP)

CHE has made a major change in how we receive proposals into our “core programs” (see list below). These core programs collectively handle about 1,300 proposals a year, and we hope the changes will reduce the burden on Principal Investigators, reviewers, panelists, and NSF staff.

### FIRST OFF, WHAT IS NOT CHANGING

- CHE’s commitment to the Disciplinary Research Programs remains very strong.
- The Program Descriptions have been updated but remain very similar to last year.
- The review criteria and review processes will be the same.
- The submission windows will stay the same.

### WHAT PROGRAMS ARE AFFECTED?

#### September Window Programs

- Chemical Catalysis (CAT)
- Chemical Structure, Dynamics and Mechanism A (CSDM-A)
- Chemical Structure, Dynamics and Mechanism B (CSDM-B)
- Chemical Synthesis (SYN)
- Chemical Theory, Models and Computation (CTMC)

#### October Window Programs

- Chemical Measurement and Imaging (CMI)
- Chemistry of Life Processes (CLP)
- Environmental Chemical Sciences (ECS)
- Macromolecular, Supramolecular and Nanochemistry (MSN)

Starting this fall, most proposals to these programs will be submitted to the new CHE Disciplinary Research Programs solicitation (*NSF 18-561*). The exceptions are proposals submitted to NSF solicitations such as:

- Faculty Early Career Development Program (CAREER) proposals should be submitted through the CAREER solicitation by the CAREER deadline date specified.
- Facilitating Research at Primarily Undergraduate Institutions: Research in Undergraduate Institutions (RUI) and Research Opportunity Awards (ROA) proposals should be submitted through the RUI/ROA solicitation during the window for the appropriate CHE Disciplinary Research Program.
- Proposals for Early-concept Grants for Exploratory Research (EAGER), Grants for Rapid Response Research (RAPID), Research Advanced by Interdisciplinary Science and Engineering (RAISE), and conferences can be submitted anytime via the PAPPG with the approval of the cognizant NSF Program Officer.
- Supplemental funding requests to existing grants can be submitted anytime with the approval of cognizant NSF Program Officer.

### With this solicitation come some other important changes!

#### 1. Number of Proposals

Through this solicitation, proposers may submit only one proposal to the CHE Disciplinary Research Programs as the PI, co-PI or senior personnel per fiscal year. 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 approval from the cognizant NSF Program Officer.

Proposals submitted to other solicitations (e.g., Centers for Chemical Innovation, Major Research Instrumentation, REU Sites, or CAREER) are also not subject to this requirement.

If more than one Disciplinary Research Programs proposal is submitted, the earliest compliant proposal will be retained and any subsequent proposals will be returned without review.

Proposers are encouraged to contact the cognizant NSF Program Officers listed in this solicitation if help is needed to resolve submission eligibility questions.

*Why? Most Principal Investigators only submit one proposal a year to these programs (or even one proposal every few years). A few PIs submit multiple, closely related proposals that create a significant review burden for the community. We'd prefer PIs focus on one, stronger proposal.*

## 2. Current and Pending Support

For each current award or pending proposal listed, PIs are asked to include one or more sentences addressing the relationship of the present proposal to their currently funded projects or pending proposals, and explain how the work proposed under this solicitation is distinct.

*Why? All federal agencies are accountable for their funding decisions and we need to ensure that we don't fund projects that are substantively the same as, or significantly overlapping with, currently funded projects. The title of the project isn't usually enough information, so we are asking for a very short statement of how the proposals differ.*

## 3. Revision Summary

For those proposals that are resubmissions of previously declined proposals by any NSF Program, PIs are required to upload, under Single Copy Documents, a statement (maximum length one page) that specifically discusses how the present proposal has been modified in response to the comments of the reviewers, panel, and Program Director (PD). This statement is not a rebuttal of the reviewer/panel/PO comments and will not be sent to the reviewers. The statement will be used internally to ascertain the extent of revisions made to the declined proposal. If the proposal has not been considered previously by a program at the NSF, a statement to that effect is sufficient. Proposals that have not been substantially revised, in the judgement of the cognizant NSF Program Director, will be returned without review.

*Why? This revision summary will allow a Principal Investigator to better communicate changes in her/his proposal to the cognizant NSF Program Director. Remember: short, factual, seen only by NSF staff.*

**Questions? Talk to us! We'll be at the ACS National Meeting in Boston, or email/call your Program Director. You can see a [staff list](#) on the CHE webpage.**

# CHE ENGAGING THE RESEARCH COMMUNITY

## 256TH AMERICAN CHEMICAL SOCIETY (ACS) NATIONAL MEETING

The 256th American Chemical Society (ACS) National meeting will be held in Boston, MA at the Boston Convention and Exhibition Center from August 19-23, 2018. Please join the Division for NSF Conversations (9 AM – 5 PM) and Luncheon (12 PM - 1:30 PM) on Monday, August 20, 2018 at the Westin Hotel Galleria. Brief remarks will be made on news items and funding opportunities at 10:00 AM, and again at 12:30 PM, and 3:00 PM. NSF CHE and other Federal funders will be available for informal conversations throughout the day, as well as “speed-coaching.” ACS attendees are not required to register for this NSF event, unless they wish to purchase lunch. NSF representatives will also be available at Table 2624 during Exhibition hours. Further details on events and locations will be made available on our website at [www.nsf.gov/chem](http://www.nsf.gov/chem).

## 45TH ANNUAL MEETING, NATIONAL ORGANIZATION FOR THE PROFESSIONAL ADVANCEMENT OF BLACK CHEMISTS AND CHEMICAL ENGINEERS (NOBCCHE)

Members of CHE will attend NOBCChE's 45th conference in Orlando, FL, September 17 – 20, 2018. CHE staff will participate in the Career Fair, poster session, and Science Bowl. Presentations on proposal preparation, merit review, navigating NSF, and funding opportunities will be on Wednesday September 19th, from 4 PM – 6 PM. NSF representatives will also be available for informal conversations 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).

## CHEMISTRY STAFFING NEWS AND RECRUITING

## THANK YOU!

The division would like to say farewell and thank you to Drs. Susan Atlas, Robert Cave, Max Funk, Luke Hanley, and Kevin Moeller for their dedication and hard work as Program Directors in the Chemistry Division. They will return to their respective universities and will be greatly missed!



**Dr. Susan Atlas,  
Research Professor**

**Institution:**  
The University of New Mexico

“Serving as a rotator in the Division of Chemistry at NSF has been an intensely rewarding experience. It has provided me with a broad

perspective on the exciting chemical research being done by new and established investigators across the U.S., and the opportunity to participate in identifying and nurturing emerging fields of inquiry, particularly within data-driven discovery science in chemistry, and convergence research.”

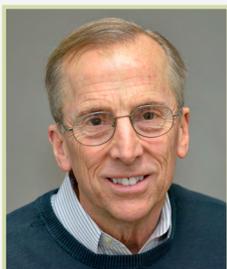


**Dr. Robert Cave,  
Professor of Chemistry**

**Institution:**  
Harvey Mudd College

“I had a wonderful time at NSF. I worked in three different programs (CTMC, CCI, and MRI) and was glad to be able to see how

each functions. It was great to learn from the Program Leads and to see, first hand, how much thought, work, and (sometimes) anguish goes into each funding recommendation. It was also thrilling to see so much great science – so many proposals with compelling and exciting ideas, and getting to discuss the proposals with panelists was a true highlight. Lastly, it is a great place to work – across the division you are surrounded by dedicated, kind, smart people who care about chemistry. It was inspiring.”



**Dr. Max Funk, Emeritus**

**Institution:**  
The University of Toledo

“Working with all the amazing people here at NSF and in the broader chemistry community was a real privilege. The entire enterprise runs on the willingness of

principal investigators to participate thoughtfully in the peer-review process, and my part in getting that to happen was fantastic. What a great experience it was for me personally to learn from your insights.”



**Dr. Luke Hanley,  
Professor and Head**

**Institution:**  
University of Illinois at Chicago

“I have been very impressed with the determination of the entire Chemistry Division to give a fair and full evaluation of all its proposals. When

contacted to serve as reviewers, investigators should remember how much the entire granting process depends upon their participation.”



**Dr. Kevin Moeller, Professor**

**Institution:** Washington University in St. Louis

“While life as an NSF rotator can be challenging, it has given me an opportunity to both give back to the community that has supported my research efforts for years and to become better connected with that community. I have especially enjoyed working with reviewers and fellow Program Directors who bring so much energy and scientific insight to their work and the panels they participate in. Their appreciation for the many current and future directions of chemistry has greatly enriched my own. I have also found the opportunity to meet so many of the young

scientists starting out on their careers to be particularly rewarding, and I am confident that many of those relationships will continue long after I return to my home institution.”

## WELCOME!



We welcome our new Pathways Student (Program Assistant), Ms. Khoren Claiborne. Ms. Claiborne joins us from the Division of Mathematical Sciences (DMS) where she served as a Program Assistant. She will support the Division

Director and some of our Chemistry Programs.

## CONGRATULATIONS!



Dr. Melissa Olson, Presidential Management Fellow, is currently on a 120-day detail to the Department of Energy (Energy Information Administration). Melissa has been working with the Office of Legislative and Public Affairs (OLPA) to post CHE content on the Twitter and

Tumblr pages. If you have highlights – she is the person to talk to! Melissa will attend the Fall National ACS Meeting, so please stop by at the booth or NSF event to say hello!

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

## WOULD YOU LIKE TO JOIN THE NSF TEAM AS A ROTATOR?

An integral subset of our program directors are rotators - members of the chemistry community that serve at NSF for 1-4 years. Maybe 2019 is the year when you would be able to come to NSF to learn about, and participate in, the funding side of the grants process? If you are interested, we would like to hear from you.

Rotators bring in fresh perspectives from their research community, oversee NSF's merit review process, make award recommendations, and help to guide the division's portfolio balance and initiatives. They 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. We prefer candidates who are well established within their individual careers – at least six years after their Ph.D.

Please reach out to our current staff with any questions, visit the *Career Opportunities* section on our division website for information on how to apply, or visit the *NSF Careers home page* for more information on being a rotator.

## PRESS RELEASE ON TRIPLETS PROGRAM

**Nationwide program launches to train new generation of quantum engineers**

Please click on the link for more information:

<http://news.uchicago.edu/article/2018/05/08/nationwide-program-launches-train-new-generation-quantum-engineers>

## CHEMISTRY FUNDING OPPORTUNITY

**Data-Driven Discovery Science in Chemistry (D3SC, NSF 18-075)**

[https://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=nsf18075](https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf18075)

For the third year, CHE encourages the submission of proposals to advance fundamental understanding of chemical systems through data-driven research. Two changes in this year's *D3SC DCL*:

- 1) The Division of Chemical, Bioengineering, Environmental, and Transport Systems (CBET's) Catalysis Program and the Process Systems, Reaction Engineering, and Molecular Thermodynamics Program have joined CHE in this DCL. Proposals in all of these areas are encouraged.
- 2) CAREER D3SC proposals should be submitted by the NSF CAREER submission deadline for the MPS and ENG directorates, respectively.
- 3) Regular CHE D3SC proposals should be submitted to the existing program of interest during the regular submission windows of the corresponding programs.
- 4) EAGER, RAISE, and supplemental funding requests through D3SC can be submitted at any time but are encouraged by **April 15, 2019, 5:00 pm**, submitter's local time, to ensure timely consideration. Consultation with one of the cognizant D3SC Program Directors for additional guidance in advance of a potential EAGER, RAISE or supplemental funding request submission is required.

For additional information, please contact D3SC cognizant Program Directors: for CHE: Lin He ([lhe@nsf.gov](mailto:lhe@nsf.gov)), or Ken Moloy ([kmoloy@nsf.gov](mailto:kmoloy@nsf.gov)); and for CBET: Robert McCabe ([rmccabe@nsf.gov](mailto:rmccabe@nsf.gov)), or Triantafillos Mountziaris ([tmountzi@nsf.gov](mailto:tmountzi@nsf.gov)).

# 2018 CHEMISTRY CAREER AWARDEES

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## Congratulations to the NSF/Chemistry 2018 CAREER Awardees!

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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 2018!



**ANOKLASE JEAN-LUC AYITOU**  
*Illinois Institute of Technology*

**Award Number:**  
1753012

**Title:**  
CAREER: Baird's Polycyclic Anti-Aromatic Chromophores & Application to Engineer Crystalline Dyads for Photon Upconversion in the Solid State



**JEREMY BASKIN**  
*Cornell University*

**Award Number:**  
1749919

**Title:**  
CAREER: Chemical Tools to Study Phosphatidic Acid Signaling Integrated with Educational Outreach in the Chemical Biology of Lipids



**RYAN BAXTER**  
*University of California-Merced*

**Award Number:**  
1752821

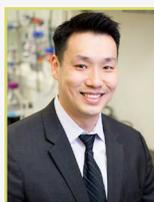
**Title:**  
CAREER: Mechanistic Study of Radical Initiations for Aromatic Functionalization



**LEAH CASABIANCA**  
*Clemson University*

**Award Number:**  
1751529

**Title:**  
CAREER: Characterizing Nanoparticle Surface Interactions using Dissolution Dynamic Nuclear Polarization-Enhanced Nuclear Magnetic Resonance



**JEFFERSON CHAN**  
*University of Illinois at Urbana-Champaign*

**Award Number:**  
1752879

**Title:**  
CAREER: Photoacoustic Imaging Probes to Study the Biology of Metal Ions



**YUE CHEN**  
*University of Minnesota-Twin Cities*

**Award Number:**  
1753154

**Title:**  
CAREER: Functional Dissection of Ubiquitination Signaling by Quantitative Chemical Proteomics



**LOI DO**  
*University of Houston*

**Award Number:**  
1750411

**Title:**  
CAREER: Site-Differentiated  
Bimetallic Catalysts for Precise  
Polyolefin Synthesis



**DORTHE EISELE**  
*CUNY City College*

**Award Number:**  
1752475

**Title:**  
CAREER: Unraveling Excitation-  
Energy Transfer Processes in Excitonic  
Light-Harvesting Systems



**BRETT FORS**  
*Cornell University*

**Award Number:**  
1752140

**Title:**  
CAREER: Development and  
Applications of Photocontrolled  
Cationic Polymerizations



**EMILIO GALLICCHIO**  
*CUNY Brooklyn College*

**Award Number:**  
1750511

**Title:**  
CAREER: CDS&E: Theory,  
Models and Computer Simulation of  
Molecular Recognition Processes



**ZIAD GANIM**  
*Yale University*

**Award Number:**  
1752847

**Title:**  
CAREER: Development of Single  
Molecule Infrared and Visible  
Absorption Spectroscopies using  
Optical Trapping Force Detection



**LAINA GEARY**  
*University of Nevada-Reno*

**Award Number:**  
1753098

**Title:**  
CAREER: Catalysis and Oxygen  
Atom Transfer



**BENJAMIN GORSKE**  
*Bowdoin College*

**Award Number:**  
1752912

**Title:**  
CAREER: Fostering Innovative  
Scientists Through Development of  
Biomimetic Catalysts for Discovery of  
New Medicines



**OSVALDO GUTIERREZ**  
*University of Maryland-College Park*

**Award Number:**  
1751568

**Title:**  
CAREER: Computational and  
Experimental Mechanistic Approach  
to Iron Catalyst and Reaction Design

**AMANDA HARGROVE***Duke University***Award Number:**  
1750375**Title:**  
CAREER: Shape-based differentiation of RNA elements using small molecules**WILLIAM HARMAN***University of California-Riverside***Award Number:**  
1752876**Title:**  
CAREER: Hybrid Borane Platforms for the Activation of Small Molecules of Energy Consequence**CHEN HUANG***Florida State University***Award Number:**  
1752769**Title:**  
CAREER: Local Correlation Approaches for High-Level Density Functional Theory Simulations of Large Systems**MARGARET JOHNSON***John Hopkins University***Award Number:**  
1753174**Title:**  
CAREER: CDS&E: Developing Reaction-Diffusion Models of Non-Equilibrium Virion Assembly and Budding**REBEKKA KLAUSEN***Johns Hopkins University***Award Number:**  
1752791**Title:**  
CAREER: Hydrophilic and Hydrophobic Polymers from Boron-Containing Polyolefins**DANIEL KURODA***Louisiana State University***Award Number:**  
1751735**Title:**  
CAREER: Molecular Characterization of Motions, Interactions, and Structure of the Lithium Salts in Organic Solvents via Non-Linear Infrared Spectroscopy**AARON LECONTE***Claremont McKenna College***Award Number:**  
1752924**Title:**  
CAREER: Development of DNA polymerases capable of high fidelity modified DNA synthesis**SONG LIN***Cornell University***Award Number:**  
1751839**Title:**  
CAREER: Catalytic Electrochemical Amination Reactions

**STEFFEN LINDERT***Ohio State University***Award Number:**  
1750666**Title:**  
CAREER: CDS&E: Protein Structure Prediction from Covalent Labeling Mass Spectrometry Data**CALEB MARTIN***Baylor University***Award Number:**  
1753025**Title:**  
CAREER: Constructing Conjugated Heteroarene Architectures via Ring-Expansion Reactions with Anti-Aromatic Boroles**DAVID MARTIN***University of California-Riverside***Award Number:**  
1751687**Title:**  
CAREER: Direct Radical Functionalization of Alcohols using Cobalt Photocatalysis**NICHOLAS MAYHALL***Virginia Tech University***Award Number:**  
1752612**Title:**  
CAREER: Many-body expansions for strongly correlated systems**CHARLES MCCRORY***University of Michigan***Award Number:**  
1751791**Title:**  
CAREER: Promoting Selective Electrochemical CO<sub>2</sub> Reduction by Controlling a Catalyst's Primary, Secondary, and Outer Coordination Spheres**ANDREW MCNALLY***Colorado State University***Award Number:**  
1753087**Title:**  
CAREER: New methods to functionalize pyridines and diazines**WILLIAM MCNAMARA***College of William and Mary***Award Number:**  
1749800**Title:**  
CAREER: Iron Complexes for Hydrogen Generation and Oxygen Reduction**CARSTEN MILSMANN***West Virginia University***Award Number:**  
1752738**Title:**  
CAREER: Earth-Abundant Transition Metal Photosensitizers Using Ligand-to-Metal Charge Transfer

**GUSTAVO MOURA-LETTES***Rowan University***Award Number:**  
1752085**Title:**  
CAREER: Metallooxaziridines for the Synthesis of Nitrogen-Containing Three-Membered Heterocycles**MICHAEL NIPPE***Texas A&M University***Award Number:**  
1753014**Title:**  
CAREER: Exploiting Novel Architectures for Advanced Heterometallic Magnetic Molecules and Materials**JOHN PARKHILL***University of Notre Dame***Award Number:**  
1751710**Title:**  
CAREER: Self-consistent models of electronic dynamics and relaxation**KATELYNN PERRAULT***Chaminade University of Honolulu***Award Number:**  
1752607**Title:**  
CAREER: Leveraging flow modulation to transform volatile organic compound measurement**BRIAN POPP***West Virginia University***Award Number:**  
1752986**Title:**  
CAREER: Reductive Carboxylation of Unsaturated Hydrocarbons**JAMES PRELL***University of Oregon-Eugene***Award Number:**  
1752994**Title:**  
CAREER: CDS&E: One- and Two-Dimensional Fourier Transform Approaches for Characterizing Nano-Assemblies with Ion Mobility-Mass Spectrometry**MONIKA RAJ***Auburn University***Award Number:**  
1752654**Title:**  
Secondary Amine Selective Petasis (SASP) Bioconjugation**SHARANI ROY***University of Tennessee***Award Number:**  
1753273**Title:**  
CAREER: Unraveling Chemical Consequences of Non-adiabatic Energy Transfer at the Gas-Surface Interface



**BRYCE SADTLER**  
*Washington University*

**Award Number:**  
1753344

**Title:**  
CAREER: Mapping the Chemical Reactivity of Metal Oxide Photocatalysts by Correlative Single-Molecule Fluorescence and Electron Microscopy



**JOSHUA SANGORO**  
*University of Tennessee-Knoxville*

**Award Number:**  
1753282

**Title:**  
CAREER: Mesoscale Aggregation and Interfacial Dynamics in Ionic Liquids



**MICHAEL SCHNIEDERS**  
*University of Iowa*

**Award Number:**  
1751688

**Title:**  
CAREER: Chemical Theory for the Protein Crystal Folding Problem



**INDRAJEET SHARMA**  
*University of Oklahoma-Norman*

**Award Number:**  
1753187

**Title:**  
CAREER: Stereoselective Carbene Cascade Cyclizations



**ADAM SMITH**  
*University of Akron*

**Award Number:**  
1753060

**Title:**  
CAREER: Lipid Regulation of Receptor Tyrosine Kinases



**PENG TAO**  
*Southern Methodist University*

**Award Number:**  
1753167

**Title:**  
CAREER: New strategy to outsmart antimicrobial resistance: Mastering evolution of beta-lactamases catalytic mechanism through reaction pathways alignment, simulation, and analysis



**RENSKE VAN DER VEEN**  
*University of Illinois-Urbana-Champaign*

**Award Number:**  
1751725

**Title:**  
CAREER: Ultrafast Imaging and Spectroscopy of Cooperative Phenomena in Photomagnetic Nanomaterials



**LUIS VELARDE**  
*SUNY at Buffalo*

**Award Number:**  
1753207

**Title:**  
CAREER: Modulating the Cybotactic Region Surrounding Colloidal Liposomes and Nanoparticles



**MACIEJ WALCZAK**  
*University of Colorado at Boulder*

**Award Number:**  
1753225

**Title:**  
CAREER: Carbohydrate Synthesis  
with Anomeric Nucleophiles



**SARAH WENGRYNIUK**  
*Temple University*

**Award Number:**  
1752244

**Title:**  
CAREER: Novel Synthetic  
Applications of Poly(cationic)  
 $\lambda$ -3 Iodanes



**JUSTIN WILSON**  
*Cornell University*

**Award Number:**  
1750295

**Title:**  
CAREER: A Toolkit to Modulate  
the Mitochondrial Calcium Uptake  
Machinery



**CATHY WONG**  
*University of Oregon-Eugene*

**Award Number:**  
1752129

**Title:**  
CAREER: In Situ Measurement of  
Ultrafast Processes During Molecular  
Aggregation



**JUDY WU**  
*University of Houston*

**Award Number:**  
1751370

**Title:**  
CAREER: Computational Studies of  
Aromaticity-Modulated Interactions  
in Supramolecular Chemistry

| Division of Chemistry                                  |  |              |                   |
|--|--|--------------|-------------------|
| Name   | Title  | Telephone    | Email             |
| Dr. Sean Jones   | Acting Division Director                             | 703-292-2986 | sljones@nsf.gov   |
| Dr. Lin He   | Acting Deputy Division Director                      | 703-292-4956 | lhe@nsf.gov       |
| Mrs. Gloria Yancey                                     | Program Support Manager                              | 703-292-4718 | gyancey@nsf.gov   |
| Ms. Debbie Jones                                       | Operations Specialist                                | 703-292-7852 | djones@nsf.gov    |
| Ms. C. Michelle Jenkins                                | Program Analyst                                      | 703-292-7874 | cjenkins@nsf.gov  |
| Dr. Melissa Olson                                      | On detail  | 703-292-7448 | molson@nsf.gov    |
| Program Assistant                                      |  |              |                   |
| Ms. Khoren Claiborne                                   | Pathways Student                                     | 703-292-2313 | kclaibor@nsf.gov  |
| Program Specialists Team                               |  |              |                   |
| Mrs. Marsha Hawkins                                    | CMI, MRI   | 703-292-4877 | mhawkins@nsf.gov  |
| Ms. Renee Ivey   | CAT, CLP   | 703-292-4928 | sivey@nsf.gov     |
| Mr. Darren Kimble                                      | CSDM-A & B, ECS, REU                                 | 703-292-7159 | dkimble@nsf.gov   |
| Ms. Kimberly Noble                                     | CTMC, MSN  | 703-292-2969 | knoble@nsf.gov    |
| Ms. Marla Stewart                                      | Centers, SYN   | 703-292-8735 | mastewart@nsf.gov |
| Technical Staff  |  |              |                   |
| Dr. Catalina Achim                                     | CLP, MSN   | 703-292-2048 | cachim@nsf.gov    |
| Dr. Susan Atlas  | CTMC, CLP  | 703-292-4336 | satlas@nsf.gov    |
| Dr. Michelle Bushey                                    | CMI, REU, Special Projects                           | 703-292-4938 | mbushey@nsf.gov   |
| Dr. Robert Cave  | CTMC, MRI, CCI                                       | 703-292-2394 | rjcave@nsf.gov    |
| Dr. Kelsey Cook  | CMI, ECS   | 703-292-7490 | kcook@nsf.gov     |
| Dr. Katharine Covert                                   | CCI  | 703-292-4950 | kcovert@nsf.gov   |
| Dr. Colby Foss   | CSDM-A   | 703-292-5327 | cfoss@nsf.gov     |
| Dr. Max Funk   | CLP  | 703-292-7441 | mfunk@nsf.gov     |
| Dr. John Gilje   | CAT, SYN   | 703-292-8840 | jwgilje@nsf.gov   |
| Dr. Evelyn Goldfield                                   | CTMC   | 703-292-2173 | egoldfie@nsf.gov  |
| Dr. Luke Hanley  | MSN, CAT   | 703-292-8653 | lhanley@nsf.gov   |
| Dr. George Janini                                      | CAT, MSN   | 703-292-4971 | gjanini@nsf.gov   |
| Dr. Richard Johnson                                    | CSDM-B   | 603-862-2302 | ricjohns@nsf.gov  |
| Dr. Bob Kuczkowski                                     | MRI  | 703-292-8840 | rkuczkow@nsf.gov  |
| Dr. Tingyu Li  | CSDM-B   | 703-292-4949 | tli@nsf.gov       |
| Dr. Kevin Moeller                                      | SYN  | 703-292-7054 | kmoeller@nsf.gov  |
| Dr. Kenneth Moloy                                      | SYN, CAT   | 703-292-8441 | kmoloy@nsf.gov    |
| Dr. Carlos Murillo                                     | MRI  | 703-292-4970 | cmurillo@nsf.gov  |
| Dr. John Papanikolas                                   | CSDM-A, MSN  | 703-292-8809 | jpapanik@nsf.gov  |
| Dr. Tarek Sammakia                                     | SYN, CAT   | 703-292-7486 | tsammaki@nsf.gov  |
| Dr. Anne-Marie Schmoltner                              | ECS  | 703-292-4716 | aschmolt@nsf.gov  |
| Dr. Suk-Wah Tam-Chang                                  | MSN  | 703-292-8684 | stamchan@nsf.gov  |
| Chemistry Program Abbreviations                        |  |              |                   |
| Chemical Catalysis (CAT)                               | Environmental Chemical Sciences (ECS)                |              |                   |
| Centers for Chemical Innovation (CCI)                  | Major Research Instrumentation (MRI)                 |              |                   |
| Chemistry of Life Processes (CLP)                      | Macromolecular, Supramolecular & Nanochemistry (MSN) |              |                   |
| Chemical Measurement & Imaging (CMI)                   | Research Experiences for Undergraduates (REU)        |              |                   |
| Chemical Structure, Dynamics & Mechanisms (CSDM A & B) | Chemical Synthesis (SYN)                             |              |                   |
| Chemical Theory, Models & Computational Methods (CTMC) |  |              |                   |

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 inquiries, comments or questions, please contact:  
Marsha Hawkins | Program Specialist, NSF/Chemistry  
Phone: 703-292-4877 | Email: [mhawkins@nsf.gov](mailto:mhawkins@nsf.gov)

