

THE CAMILLE & HENRY DREYFUS FOUNDATION

2023 in Review



Xiaowei Zhuang gives the 2023 Dreyfus Prize lecture at Harvard University (Photo credit: junvalenciaphotography.com)

Letter from the President, H. Scott Walter



I hope this letter finds you well. The year 2023 was outstanding for the Foundation once again, with many exciting awards, gatherings, and developments.

Our flagship Teacher-Scholar program, now in its 53rd year, conferred 26 awards in 2023 to outstanding young faculty in the chemical sciences, providing support for their work in research and education.

Xiaowei Zhuang was selected as the 2023 winner of the Dreyfus Prize in the Chemical Sciences, conferred in “Imaging in the Chemical Sciences.” A ceremony was held at Harvard University to present the award, which was a wonderful evening for science and community. The Foundation is proud to have given its highest honor to such a talented researcher.

We were also delighted this year to congratulate our dear friend and former Dreyfus Foundation Advisor **Louis E. Brus**, who along with **Moungi G. Bawendi** (1990 Dreyfus Foundation New Faculty Awardee) and **Aleksey Yekimov** was awarded the 2023 Nobel Prize in Chemistry “for the discovery and synthesis of quantum dots.”

The year 2023 was full of exceptional events. We saw a surge of Jean Dreyfus Lectureships, making up for delays caused by the pandemic. These lectures bring outstanding researchers to undergraduate institutions for substantial interactions with faculty, students, and the public. The Dreyfus Lecture Series at the University of Basel, alma mater of the Foundation’s namesakes, continued with a terrific visit from esteemed researcher **Steven A. Benner**.

At the spring American Chemical Society (ACS) National Meeting we celebrated the winners of two Foundation-sponsored ACS Awards: for Encouraging Underrepresented and Economically Disadvantaged

Students and Encouraging Women into Careers in the Chemical Sciences. At the fall meeting we sponsored an insightful Symposium to capstone our Machine Learning in the Chemical Sciences program, where distinguished grantees spoke about this exciting field.

The Foundation said goodbye to two Board members this year: **John R. H. Blum**, who has helped shape the vision of the Foundation for over four decades, and **Richard N. Zare** of Stanford University, who lent his impeccable scientific expertise to the Board over an eight-year term. We also said farewell to our Executive Director **Scott A. Siegel**, who retired at the end of 2023. On behalf of the Dreyfus Foundation, I want to sincerely thank all three individuals for their dedicated service to both the Foundation and the broader chemical sciences community. They will be missed.

Looking ahead to 2024, we are thrilled to announce some organizational changes. **Matthew V. Tirrell**, longtime Director and Chair of the Scientific Affairs Committee, will take on the newly created part-time advisory role of Senior Scientific Advisor. In this role he will focus on supporting our award programs. **Gerry Brandenstein** is promoted to Managing Director, after over 30 years of dedicated service. **Ali Chunovic** is also promoted to Senior Program Manager.

With these changes, we are excited to continue our flagship programs, release new films through *Chemistry Shorts*, attend the ACS-Dreyfus Prize Symposium, announce the topic for the 2025 Dreyfus Prize, and convene with our grantees at the Teacher-Scholar Symposium. As always, we continue to explore new avenues for making the greatest impact on the chemical sciences community.

Thank you and best wishes to all for a healthy and productive 2024!

A handwritten signature in black ink that reads "H. S. Walter". The signature is written in a cursive, flowing style.

Xiaowei Zhuang Receives 2023 Dreyfus Prize

Xiaowei Zhuang, Howard Hughes Medical Institute Investigator and David B. Arnold Jr. Professor of Science, Harvard University, was the recipient of the 2023 Dreyfus Prize in the Chemical Sciences.

Zhuang was recognized for pioneering work to develop groundbreaking super-resolution imaging and genome-scale imaging methods and utilizing those methods to gain important new insights about biological molecules and systems.

This international Prize, conferred by the Foundation on a biennial basis, includes a \$250,000 award and a formal lecture and celebration event at the institution of the recipient. A prize topic is selected each award cycle, and this year the topic was “Imaging in the Chemical Sciences.”

A groundbreaking leader in the field of super-resolution microscopy, Zhuang invented STORM (stochastic optical reconstruction microscopy), one of the earliest and most widely used super-resolution imaging methods. Overcoming the historical limitation of imaging resolution due to light diffraction, she creatively employed photoswitchable dyes and single-molecule imaging to increase the resolution of light microscopy to more than 10-times better than the diffraction limit. This methodology has been a key tool in advancing the understanding of molecular structures in cells, with her original 2006 paper alone garnering more than 8,000 scientific citations.

More recently, Zhuang invented MERFISH (multiplexed error-robust fluorescence in situ hybridization), a powerful method that took imaging to the genome scale. The technique uses error-robust barcoding, combinatorial labeling, and sequential imaging to allow for the determination of the precise copy number and spatial distribution of thousands of RNA species in individual cells, enabling single-cell transcriptome imaging. Zhuang further extended MERFISH to enable 3D-genome imaging and epigenome imaging. MERFISH transformed the studies of gene regulation in cells

and the molecular and cellular architecture of biological tissues.

These methods and insights have had a widespread impact in the fields of chemistry, biology, neuroscience, and medicine. Zhuang and her team have also actively employed these new methodologies to derive insights into areas such as the cell atlas of the brain, molecular structures in neurons, and 3D organization of the genome.

Zhuang stated, “I am deeply honored to receive the 2023 Dreyfus Prize in the Chemical Sciences. I would like to thank the Camille and Henry Dreyfus Foundation for being a leading supporter of the chemical sciences community for over 75 years.”

The Dreyfus Prize in the Chemical Sciences, which began in 2009, is conferred to a groundbreaking scientist in a specific area of chemistry every two years. It is the highest honor of the Camille and Henry Dreyfus Foundation.



Zhuang receives her certificate from Foundation President H. Scott Walter (Photo credit: junvalenciaphotography.com)

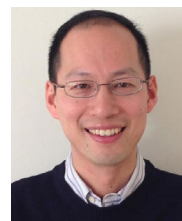
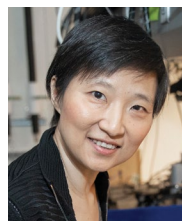
2024 Dreyfus/ACS Symposium on Imaging in the Chemical Sciences

The Foundation has organized a one-day ACS Presidential Symposium to be held at the 2024 spring National Meeting in New Orleans. The Symposium will center around the topic of the 2023 Dreyfus Prize: Imaging in the Chemical Sciences.

Prize-winner [Xiaowei Zhuang](#), Harvard University, will be featured with her talk *Spatially Resolved Single-Cell Genomics & Cell Atlas of the Brain*; as well as other leaders in the field including:

Christopher Chang, University of California, Berkeley
Activity-Based Sensing: Leveraging Chemical Reactivity for Selective Bioimaging

Naomi Ginsberg, University of California, Berkeley
Imaging Nanoscale Electronic, Thermal, and Ionic Energy Transduction and Transport in Emerging Functional Materials



Left to right: Zhuang, Chang, Ginsberg, Hanein, Ho, Weiss

Dorit Hanein, University of California, Santa Barbara
Nanometer Scale Dissection of Cellular Processes - A Multiscale Imaging Journey from Live Cells to Cellular Cryogenic Tomography

Wilson Ho, University of California, Irvine
The Quantum Superposition Microscope

Paul Weiss, University of California, Los Angeles.
Nanoscale Chemical Imaging

Dreyfus-Sponsored ACS Awards

Since 1995, the Foundation has sponsored two annual National Awards that are administered by the American Chemical Society: the awards for [Encouraging Underrepresented and Economically Disadvantaged Students into Careers in the Chemical Sciences](#) and for [Encouraging Women into Careers in the Chemical Sciences](#). In 2023, these awards were made to **Ann C. Kimble-Hill**, Indiana University, and **Caroline Ylitalo**, 3M respectively.



Kimble-Hill receiving her award from Foundation President H. Scott Walter and ACS President Judith Giordan (Photo credit: EPNAC.com)

Each award consists of a \$5,000 stipend to the awardee, \$1,500 in travel funds, and a separate grant of \$10,000 to an eligible non-profit institution, designated by the recipient, to strengthen the objectives of their award. Ylitalo directed her award to support the Twin Cities Regional Science Fair and Kimble-Hill's grant supports the research activities of five undergraduate students at Indiana University.



Ylitalo receiving her award from Foundation President H. Scott Walter and ACS President Judith Giordan (Photo credit: EPNAC.com)

2023 Dreyfus/ACS Symposium on Machine Learning

The Foundation held a one-day [ACS Presidential Symposium on Machine Learning](#) at the fall National Meeting in San Francisco in August 2023. The Symposium featured distinguished speakers **Klavs Jensen**, Massachusetts Institute of Technology; **Yu-Shan Lin**, Tufts University; **Milad Abolhasani**, North Carolina State University; **Brett**

Savoie, Purdue University; **Andrew Ferguson**, University of Chicago; and **Thomas Miller**, Entos, Inc. This event was a capstone to the Foundation's Program in Machine Learning in the Chemical Sciences and Engineering [that concluded in July 2022](#) after awarding over \$2.4 million to more than 20 research teams.



Left to right: Jensen, Lin, Abolhasani, Savoie, Ferguson, Miller

Dreyfus Lectureship at the University of Basel

The 2023 Camille and Henry Dreyfus Lectureship at the University of Basel featured a visit from **Steven A. Benner**, The Foundation for Applied Molecular Evolution, in October. This annual Lectureship, sponsored by the Foundation, honors the legacy of Camille and Henry Dreyfus, the groundbreaking scientist-entrepreneur brothers who both earned their doctorates in Organic Chemistry at the University of Basel in the early 20th century.



Benner receives his certificate for giving the Lectureship from Andrea Schenker-Wicki, President of the University of Basel (Photo credit: University of Basel)

News of the Board, Advisors, and Staff



[John R. H. Blum](#) retired from the Board of Directors after 44 years of dedicated service. Blum was elected to the Board of Directors in 1979 and has held many leadership positions at the Foundation, including Vice President, Treasurer, Secretary, and Chair of the Compensation and Finance and Audit committees.



[Richard N. Zare's](#) term on the Board of Directors ended in April 2023. Zare joined the Foundation as an Advisor in 2007. In April 2010, he was elected to the Foundation's Board of Directors. Zare is the Marguerite Blake Wilbur Professor in Natural Science at Stanford University.



[Matthew V. Tirrell](#) lends his scientific expertise to the Foundation as the newly appointed Senior Scientific Advisor, supporting the Foundation's award programs. Tirrell is the D. Gale Johnson Distinguished Service Professor Emeritus at the University of Chicago.

[Scott A. Siegel](#) retired at the end of 2023, after serving as the Foundation's Executive Director since early 2021. During his stewardship the Foundation implemented a series of operational and process improvements designed to propel the Foundation into the future. His work at the Foundation followed a distinguished 35+ year career in biotechnology as both a scientific and business leader.

[Gerry Brandenstein](#) was promoted to Managing Director after over 30 years of dedicated service. [Ali Chunovic](#) was promoted to Senior Program Manager.

Chemistry Shorts™: New and Upcoming Films

The [Chemistry Shorts™](#) series is a collection of short films conceived and sponsored by the Foundation. Focused on inspiring young people at the high school and early undergraduate level, each film spotlights the positive impact that chemists and chemical engineers have on modern life as they work to solve important problems and create new opportunities that benefit humanity.



Warren in “Frosty Formulations” (Photo credit: Day’s Edge Productions)

“[Driving Reactions](#)” was launched in early 2023 and explores the power of harnessing nature’s own innovations to solve problems. Featured scientists **Hal Alper**, University of Texas at Austin, and Nobel Laureate **Frances Arnold**, California Institute of Technology, use directed evolution to design enzymes that work as molecular machines, helping create a more sustainable world using the power of chemistry. The film focuses on Alper’s innovative work to design an enzyme that can efficiently degrade PET, one of the most common plastics found in water bottles and other everyday objects, into more easily recyclable and reusable products.

“[Frosty Formulations](#),” launched in December 2023, explores the chemistry behind one of the world’s favorite desserts. Ice Cream Scientist™ **Maya Warren** takes us down to the microscopic level to discuss how ice cream is a solid, liquid, and gas all at once, and how the combination of those three states gives it its distinctive texture. The film also dives deeper into the key steps in making ice cream that allow suspended fat globules to partially coalesce like soap bubbles: with the addition of an emulsifier, cold temperature, and friction from the churning ice cream maker.

In early 2024, a new film on chirality will be released.



Alper in “Driving Reactions” (Photo credit: Day’s Edge Productions)

The films are accompanied by a lesson plan for use in high school and early college classrooms. Both the films and lesson plans are available to students, educators, and others completely free of charge via chemistryshorts.org. The series is funded in part by the Gordon and Betty Moore Foundation.

2023 Dreyfus Foundation Awardees

Dreyfus Prize in the Chemical Sciences

Xiaowei Zhuang, *Harvard University*

Camille Dreyfus Teacher-Scholar Awards

Vinayak Agarwal, *Georgia Institute of Technology*

Eszter Boros, *Stony Brook University*

Stephen Fried, *Johns Hopkins University*

Ariel Furst, *Massachusetts Institute of Technology*

Grace Han, *Brandeis University*

Chong Liu, *University of Chicago*

Jarad Mason, *Harvard University*

Phillip Milner, *Cornell University*

Lea Nienhaus, *Florida State University*

Jia Niu, *Boston College*

Allie Obermeyer, *Columbia University*

Lauren O'Connell, *Stanford University*

Zachariah Page, *The University of Texas at Austin*

Kimberly See, *California Institute of Technology*

Christo Sevov, *The Ohio State University*

Alexandra Velian, *University of Washington*

Muzhou Wang, *Northwestern University*

Wenjing Wang, *University of Michigan*

Henry Dreyfus Teacher-Scholar Awards

Michael Bertucci, *Lafayette College*

Tim Kowalczyk, *Western Washington University*

Tyler Meldrum, *William & Mary*

Heather Miller, *High Point University*

Scott Simpson, *St. Bonaventure University*

Monica So, *California State University, Chico*

Eric Villa, *Creighton University*

Amanda Wolfe, *University of North Carolina Asheville*

Jean Dreyfus Lectureship for Undergraduate Institutions

Bard College

Colorado State University Pueblo

Harvey Mudd College

Idaho State University

Illinois State University

State University of New York at New Paltz

Tennessee Technological University

West Chester University

Dreyfus Sponsored Awards

ACS Award for Encouraging Underrepresented and Economically Disadvantaged Students into Careers in the Chemical Sciences

Ann C. Kimble-Hill, *Indiana University*

ACS Award for Encouraging Women into Careers in the Chemical Sciences

Caroline Ylitalo, *3M*

2024 Award Programs and Deadlines

The Dreyfus Prize in the Chemical Sciences,

awarded biennially, consists of a monetary award of \$250,000, a medal, and a certificate. The prize, which is open to international nominations, is awarded to an individual in a selected area of chemistry to recognize exceptional and original research that has advanced the field in a major way. The topic of the 2025 Prize will be announced in summer 2024, with the winner announced in spring 2025.

Nomination Deadline: December 5, 2024

The Camille Dreyfus Teacher-Scholar Awards Program

supports the research and teaching careers of talented young faculty in the chemical sciences at Ph.D.-granting institutions. Based on institutional nominations, the program provides discretionary funding to faculty prior to their sixth year of appointment. Criteria for selection include an independent body of scholarship attained as independent researchers and a demonstrated commitment to education. The award provides an unrestricted research grant of \$100,000.

Nomination Deadline: February 1, 2024

The Henry Dreyfus Teacher-Scholar Awards

Program supports the research and teaching careers of talented young faculty in the chemical sciences at primarily undergraduate institutions. Based on institutional nominations, the program provides discretionary funding to faculty who are within the fourth and twelfth years of their independent academic careers. The award is based on accomplishment in scholarly research with undergraduates, as well as a compelling commitment to teaching. The award provides an unrestricted research grant of \$75,000.

Nomination Deadline: August 1, 2024

The Jean Dreyfus Lectureship for Undergraduate Institutions

provides an \$18,500 grant to bring a leading researcher to a primarily undergraduate institution to give a series of lectures in the chemical sciences, at least one of which is promoted and accessible to the general public. The lecturer is expected to substantially interact with undergraduate students and faculty over the period of the visit. The program provides funds to host the speaker and to support summer research opportunities for two undergraduate students.

Application Deadline: August 1, 2024

The ACS/Dreyfus Awards for Encouraging Underrepresented and Economically Disadvantaged Students into Careers in the Chemical Sciences and Encouraging Women into Careers in the Chemical Sciences,

sponsored by the Camille and Henry Dreyfus Foundation, recognize significant accomplishments by individuals in stimulating these students to choose careers in the chemical sciences and engineering. Each award consists of \$5,000 for the winner, \$1,500 in travel funds, and a grant of \$10,000 to an eligible non-profit institution, designated by the recipient, to strengthen its activities in meeting the objectives of the award. See the American Chemical Society's website for additional information: <http://www.acs.org>

The ACS Scholars Program, supported by the Camille and Henry Dreyfus Foundation, provides for multi-year scholarships, along with mentoring, to support talented undergraduate students that come from ethnic and racial groups that have been historically underrepresented in the chemical sciences. Awardees are eligible to receive up to \$5,000 in scholarship funding per year. See the American Chemical Society's website for additional information: <http://www.acs.org>

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Chloe Rickert
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Scott A. Siegel
Executive Director, 2021-2023

About the Camille and Henry Dreyfus Foundation

The purpose of the Camille and Henry Dreyfus Foundation, Inc., is to advance the science of chemistry, chemical engineering, and related sciences as a means of improving human relations and circumstances throughout the world. Established in 1946 by chemist, inventor, and businessman Camille Dreyfus as a memorial to his brother Henry, the Foundation became a memorial to both men when Camille Dreyfus died in 1956. Throughout its history the Foundation has sought to take the lead in identifying and addressing needs and opportunities in the chemical sciences through a series of programs and awards.



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