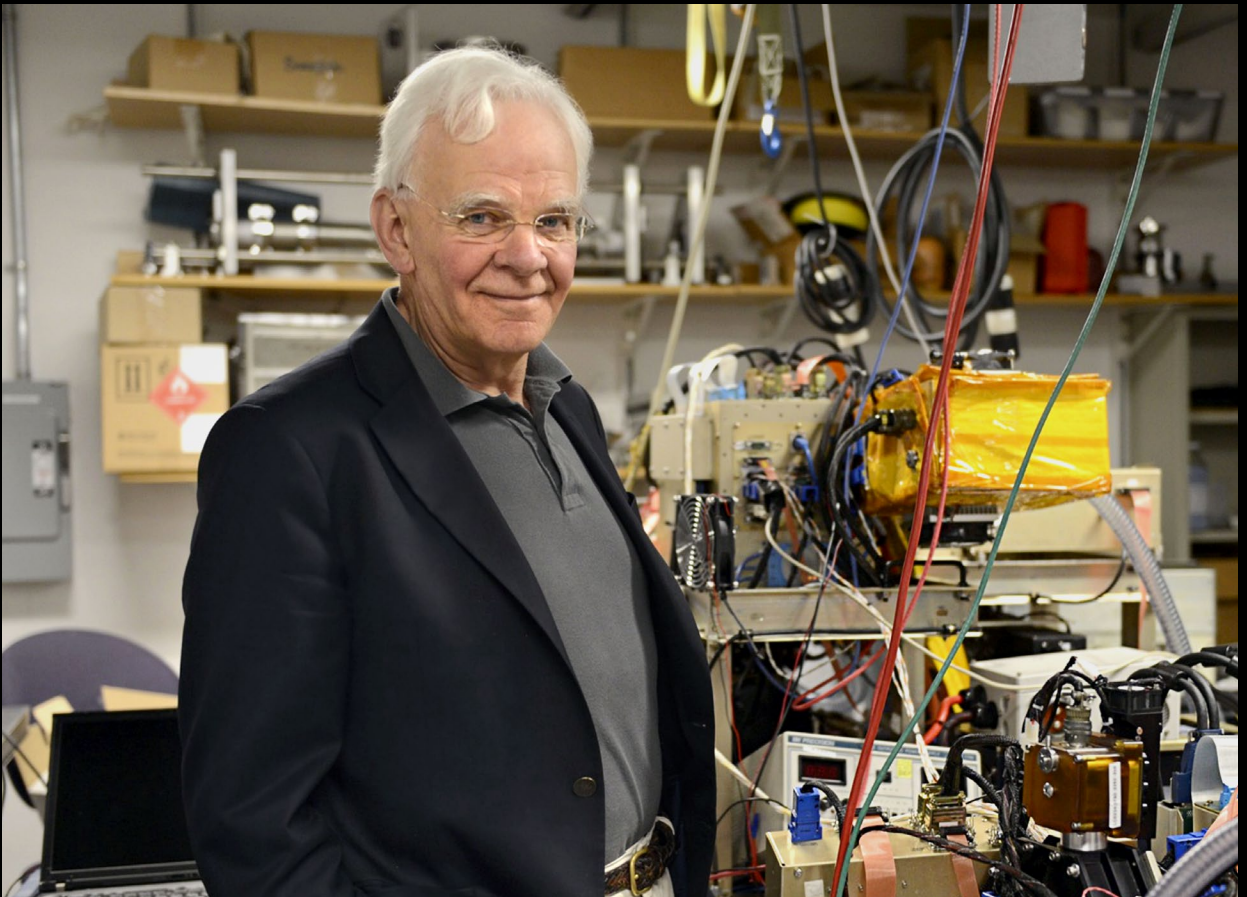




THE CAMILLE & HENRY DREYFUS FOUNDATION

## 2021 in Review



*James G. Anderson, 2021 Dreyfus Prize winner*

# Letter from the President, H. Scott Walter



I hope this letter finds you well. Much like the year that preceded it, the events of 2021 required all of us to be flexible and prepared for change. In these uncertain times, the Dreyfus Foundation seeks to continue to support

chemists and chemical engineers who are at the forefront of creating positive changes and educating the next generation who will carry on this tradition of innovation.

Jim Anderson of Harvard University is the embodiment of a scientist in this tradition. His research has contributed enormous benefits to humanity and he is also a deeply committed teacher and communicator. The Foundation recognized his monumental achievements in Environmental Chemistry with the 2021 Dreyfus Prize. He was presented with the Prize in a small, private ceremony last fall, and if circumstances allow we will honor him in a larger, public gathering at Harvard in 2022.

Anderson will be the keynote speaker at the Dreyfus Symposium on Environmental Chemistry, which will be held at the spring national meeting of the American Chemical Society in San Diego on March 22. Further details about the symposium are found in this report and on the Dreyfus website. We hope you will join us, whether in person or online.

Last year's continued limitations on public gatherings meant that both the Dreyfus/ACS symposium on Chemistry in Support of Human Health and the Dreyfus Teacher-Scholar conference were held online. Though these events prompted some spirited exchanges, it is always inspiring when the Dreyfus community has an opportunity to gather in person, so we hope this will be possible soon. In the meantime, if you were unable to attend the Chemistry in Support of Human Health symposium, all the talks are available on the Dreyfus Foundation's YouTube channel.

In another exciting new chapter, last June we were pleased to welcome Scott A. Siegel as our new Executive Director. Scott has led a highly distinguished career as both a scientific and business leader for over 35 years. The Board and I look forward to working with Scott to make positive contributions and engage with the community we serve.

We also want to acknowledge our previous Executive Director, Mark Cardillo, for his substantial contributions to the Foundation's mission over the previous 18 years. It was a period of significant activity that included establishment of several new programs and events, including the Dreyfus Prize.

In closing, I want to remember Marye Anne Fox and H. Marshall Schwarz, two former Directors of the Dreyfus Foundation, who passed away last year. Marye Anne was a pioneering chemist and leader in both science and education, whose career included tenures as chancellor at the University of California, San Diego, and North Carolina State University. Marye Anne began her association with the Foundation in 1991, was elected to the Board in 2002, and chaired the Scientific Affairs Committee for several highly productive years. Marshall Schwarz also had a highly distinguished career that included serving as the Chief Executive Officer of the U.S. Trust Company. He was also very active in the world of philanthropy, and served on the Dreyfus Board for over three decades. He made substantial contributions to the Foundation's Finance and Audit Committee, on which he served for his entire tenure with the Board.

We are indeed fortunate to have had these leaders of great distinction contribute to the Dreyfus Foundation's mission. Though they will be deeply missed, their influence will continue to guide us in our mission of serving the chemical sciences community in the years ahead.

A handwritten signature in black ink that reads "H. S. Walter". The signature is written in a cursive style with a long horizontal line extending from the end.

# Jim Anderson Receives 2021 Dreyfus Prize



Jim Anderson Presented with the 2021 Dreyfus Prize by H. Scott Walter

James G. Anderson, the Philip S. Weld Professor in Chemistry at Harvard University, is the recipient of the 2021 Dreyfus Prize in the Chemical Sciences, conferred in Environmental Chemistry. The international Prize, awarded biennially, consists of a \$250,000 award, a medal, and a citation. A public award ceremony is planned to be held at Harvard in 2022.

Anderson received this award for decades of landmark contributions to the field of environmental chemistry. He is honored for *pioneering measurements of the free radicals that drive the chemistry of the atmosphere, establishing the foundation for worldwide agreements to protect the stratospheric ozone layer.* His work and advocacy have had an enduring impact on scientists, policymakers, students, and society. He is a towering figure in the field, renowned for his extraordinary abilities to both distill the most important questions that characterize the complex photochemical system of the stratosphere and then to perform the extremely challenging experiments required to address them.

Anderson's high-altitude measurements of the reaction kinetics of chlorine radicals derived from chlorofluorocarbons, also known as CFCs, directly shaped the Montreal Protocol, a milestone global agreement to protect the stratospheric ozone layer. His work demonstrated conclusively that CFCs were responsible for the massive destruction of stratospheric ozone. As a direct result of Anderson's research and testimony, CFC emissions harmful to the atmosphere were phased out.

Anderson's results are widely considered to be the gold standard for reaction rate data and *in situ* observations of free radicals, reactive intermediates, and isotopes in

the stratosphere. The reactions that he identified in the atmosphere were then studied rigorously in his laboratory by developing ultrasensitive laser and detection techniques. The laser-based systems he developed, to measure concentrations as low as 1 part in  $10^{14}$ , provided the ability to quantitatively establish the rate of catalytic loss of ozone that allowed the direct testing of models of stratospheric chemistry.

Recently, Anderson made a link between the decrease of stratospheric ozone and global climate change. The increase in violent thunderstorms, particularly in the Midwestern United States, transports water vapor into the relatively dry stratosphere. Anderson's work has shown that the radicals that originate from this increased water concentration contribute substantially to a loss of this protective layer of ozone.

Anderson's influence is further amplified by his work as an educator. His latest book, *University Chemistry: Frontiers and Foundations from a Global and Molecular Perspective* (MIT Press), provides a blueprint to teach introductory chemistry concepts within the larger context of technology, global energy, and climate. His novel approach motivates students by using real-world problems that can be solved by chemistry and is the foundation of a widely popular course at Harvard.

"Jim Anderson has created the tools and the instrumentation to understand the mechanistic links among the chemistry, radiation, and dynamics in the atmosphere that control climate," stated Matthew Tirrell, Chair of the Dreyfus Foundation Scientific Affairs Committee and Dean of the Pritzker School of Molecular Engineering at The University of Chicago.

H. Scott Walter, President of the Dreyfus Foundation, remarked, "Jim Anderson's contributions to our understanding of environmental chemistry are extraordinary and profound. We have all benefited from his work. The Foundation is thrilled to recognize his accomplishments with the Dreyfus Prize."

Anderson stated, "Increasingly, private scientific foundations are driving innovation within rapidly developing, multidisciplinary, scientific initiatives of critical importance to both expanded educational opportunities and unprecedented research opportunities. For seventy-five years the Dreyfus Foundation has pioneered innovation in chemistry and chemical engineering in the context of coupling research and education to societal responsibility, and to solve global scale issues that sustain the human endeavor. Thus, I am deeply moved by receiving the Dreyfus Prize in the Chemical Sciences."

# Dreyfus/ACS Symposium on Environmental Chemistry

The Dreyfus Foundation has organized a one-day symposium on Environmental Chemistry, the topic of the 2021 Dreyfus Prize, to be held at the spring national meeting of the American Chemical Society in San Diego on Tuesday, March 22, 2022. The scheduled sequence of speakers appears below. For information on how to attend, please visit <https://www.acs.org>.

**Barbara Finlayson-Pitts**, University of California, Irvine  
*Atmospheric Chemistry and the Fundamental Chemical Sciences*



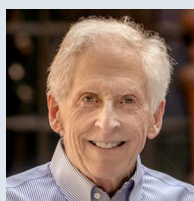
Finlayson-Pitts



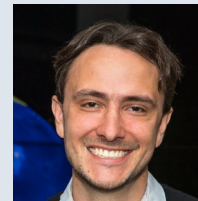
Grassian

**Vicki Grassian**, University of California, San Diego  
*Interfacial and Multiphase Environmental Chemistry*

**John Seinfeld**, California Institute of Technology  
*Atmospheric Chemistry and Physics: Air Pollution to Climate Change*



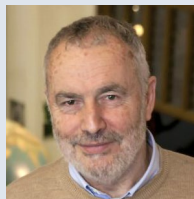
Seinfeld



Schroeder

**Dustin Schroeder**, Stanford University  
*Observing the Evolving Subsurface Environments of Ice Sheets with Ice Penetrating Radar*

**Francois Morel**, Princeton University  
*The Effect of Ocean Acidification on Marine Phytoplankton*



Morel



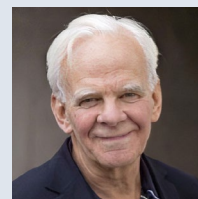
Anastas

**Paul Anastas**, Yale University  
*Green Chemistry: The "And Therefore" of Environmental Chemistry*

**Frank Keutsch**, Harvard University  
*Chemical Intervention Via Stratospheric Aerosol Injection: Risk and Efficacy of Non-Sulfate Materials*



Keutsch



Anderson

**James G. Anderson**, Harvard University  
*Quantitative Forecasts of Risk Triggered by Climate Change Resulting from Fossil Fuel Use*

## Dreyfus-Sponsored ACS Awards



Kay Brummond



Elaine Yamaguchi

Since 1995, the Dreyfus Foundation has sponsored two annual awards that are administered by the American Chemical Society: the awards for Encouraging Women into Careers in the Chemical Sciences, and for Encouraging Underrepresented and Economically Disadvantaged Students into Careers in the Chemical Sciences. In 2021, these awards

were made to Kay Brummond, University of Pittsburgh, and Elaine Yamaguchi, Chevron Oronite, respectively.

Each award consists of \$5,000 to the awardee and a grant of \$10,000 to an eligible non-profit institution, designated by the recipient, to strengthen the objectives of their award. Brummond directed her award to support the participation of two women students in the University of Pittsburgh's Summer Undergraduate Fellowship program. Yamaguchi's grant supports the San Joaquin Valley Local Section of the American Chemical Society and their recruitment of student-faculty teams to study chemistry, especially agricultural chemistry, in the region.

## Chemistry Shorts: New Film & Moore Foundation Partnership

The Chemistry Shorts film series, presented by the Dreyfus Foundation, 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. Each film is accompanied by a lesson plan for use in high school and early college classrooms. The newest film, *Untapped Potential*, focuses on ways that chemists and chemical engineers are critical to ensuring that water is both healthy and available. It features appearances from three prominent experts in the field: Meagan Mauter (Stanford), David Sedlak (UC Berkeley), and William Tarpeh (Stanford).

In 2021, based upon the initial success of the first three productions, the Foundation established Chemistry Shorts as a formal program. Further, Chemistry Shorts



*William Tarpeh of Stanford University in Untapped Potential*

received a major grant from the Gordon and Betty Moore Foundation, which will increase both the rate of production and the reach of these productions, allowing for at least six additional films to be produced over the next

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MOORE  
FOUNDATION**

three years. We invite you to watch these films at [chemistryshorts.org](http://chemistryshorts.org) and on YouTube.

## News of the Board, Advisors, and Staff



**Daniel G. Nocera**, the Patterson Rockwood Professor of Energy at Harvard University, was elected to the Board of Directors in 2021. Nocera's group has pioneered studies in renewable energy conversion, including the invention of both the artificial leaf and the bionic leaf. He has received many awards and honors, including the Leigh Ann Conn Prize, the Eni Prize, the IAPS Award, and the Burghausen Prize. He is a member of the AAAS, NAS, and Indian Academy of Sciences.



**Juan de Pablo**, Liew Family Professor of Molecular Engineering at The University of Chicago, was elected to serve as an Advisor. His research focuses on polymeric, colloidal, and liquid crystalline materials. He develops molecular models and advanced computational algorithms for simulations of molecular and

large-scale processes occurring over wide ranges of length and time scales. His many awards include the Charles Stine Award, the DuPont Medal, and the Intel Patterning Science Award. He is a Fellow of the AAAS, APS, and NAE.



**Scott A. Siegel** was welcomed as the Foundation's new Executive Director in May. Trained as a biochemist, his work in Biotech focused on drug discovery & development in oncology, infectious diseases, and immunology.

During this time he co-invented the ground-breaking biologic Remicade®. Prior to joining the Foundation, Scott held leadership roles as VP & CBO at ATCC, COO at Ezose Sciences, VP at Redpoint Bio, and Exec. Director at J&J. He previously served as an Adjunct Associate Professor of Microbiology at the University of Pennsylvania and more recently as Lecturer at the Wharton School. He has broad international business experience, facilitating partnerships across North America, Europe, and Asia.

## Board of Directors

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Paul Woitach  
*Vice President*

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Matthew V. Tirrell  
*Chair, Scientific Affairs Committee*

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Edward A. Reilly

Dorothy Dinsmoor

Richard N. Zare

Daniel G. Nocera

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Jean Dreyfus, 1956-1991

Dorothy Dinsmoor, 1991-2009

Henry C. Walter, 2009-2020

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Juan de Pablo

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*Operations Manager*

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The mission of the Camille and Henry Dreyfus Foundation 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.



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# 2021 Awards

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## **The Dreyfus Prize in the Chemical Sciences**

James G. Anderson, *Harvard University*

## **Camille Dreyfus Teacher-Scholar Awards**

John S. Anderson, *The University of Chicago*

Carlos R. Baiz, *The University of Texas at Austin*

Christopher M. Bates, *University of California,*

*Santa Barbara*

Oswaldo Gutierrez, *Texas A&M University*

Julia A. Kalow, *Northwestern University*

Markita P. Landry, *University of California, Berkeley*

Song Lin, *Cornell University*

Nikhil S. Malvankar, *Yale University*

Karthish Manthiram, *Massachusetts Institute of Technology*

David E. Olson, *University of California, Davis*

Brenda M. Rubenstein, *Brown University*

Ian B. Seiple, *University of California, San Francisco*

Luisa Whittaker-Brooks, *The University of Utah*

Xiaoji G. Xu, *Lehigh University*

Mingxu You, *University of Massachusetts Amherst*

Joel Yuen-Zhou, *University of California, San Diego*

## **Henry Dreyfus Teacher-Scholars**

Michael G. Campbell, *Barnard College*

Amanda R. Murphy, *Western Washington University*

Katelynn R. Perrault, *Chaminade University of Honolulu*

Christine Phillips-Piro, *Franklin & Marshall College*

Marino J. E. Resendiz, *University of Colorado Denver*

S. Chantal E. Stieber, *California State Polytechnic University, Pomona*

Grace Y. Stokes, *Santa Clara University*

Kristen E. Whalen, *Haverford College*

## **Machine Learning in the Chemical Sciences and Engineering**

Milad Abolhasani, *North Carolina State University*

Garnet K. Chan, *California Institute of Technology*

Sriram Chandrasekaran, *University of Michigan*

Qiang Cui, *Boston University*

Abigail Doyle, *University of California, Los Angeles*

Rafael Gomez-Bombarelli, *Massachusetts Institute of Technology*

Nicholas E. Jackson, *University of Illinois at Urbana-Champaign*

## **Jean Dreyfus Lectureship for Undergraduate Institutions**

College of the Holy Cross

Fairfield University

Lewis & Clark College

Macalester College

Union College

University of Maryland Eastern Shore

Willamette University

## **Dreyfus-Sponsored Awards**

### **ACS Award for Encouraging Women into Careers in the Chemical Sciences**

Kay M. Brummond, *University of Pittsburgh*

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

Elaine S. Yamaguchi, *Chevron Oronite*

# Award Programs and 2022 Deadlines

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**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 2023 Prize will be announced in the summer of 2022.

*Deadline:* December 2, 2022

**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.

*Deadline:* February 2, 2022

The Dreyfus program for **Machine Learning in the Chemical Sciences and Engineering** provides funding for innovative projects in any area of machine learning that relate to the Foundation's broad objective to advance the chemical sciences and chemical engineering. The Foundation anticipates these projects will contribute fundamental chemical insights and innovation in the field. As a guide, past grant awards have ranged from \$50,000–\$150,000. Use of funds as partial contributions to larger scale efforts will be considered.

*Deadline:* April 7, 2022

**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.

*Deadline:* August 4, 2022

**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.

*Deadline:* August 4, 2022

The Camille and Henry Dreyfus Foundation sponsors the American Chemical Society awards for **Encouraging Underrepresented and Economically Disadvantaged Students into Careers in the Chemical Sciences** and for **Encouraging Women into Careers in the Chemical Sciences**. The awards recognize significant accomplishments by individuals in stimulating these students to choose careers in the chemical sciences and engineering. Each award consists of \$5,000, a certificate, 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>

*Deadlines for both awards:* November 1, 2022