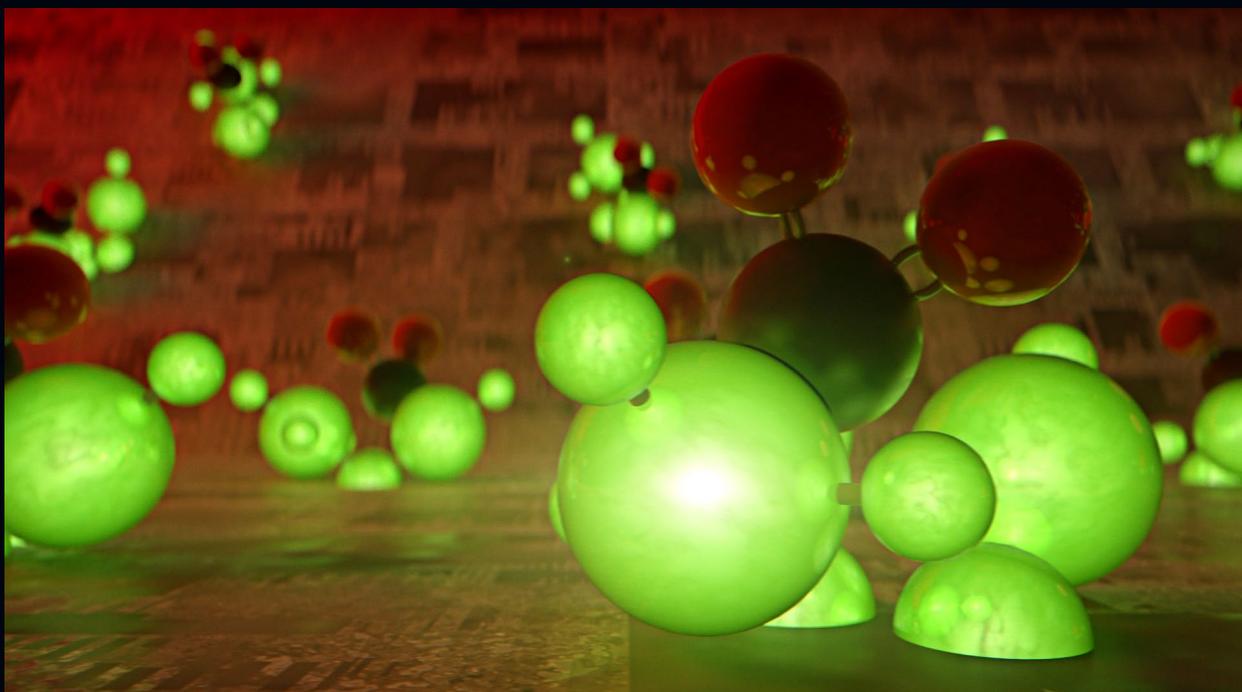


## 2020 in Review



*From the latest Chemistry Shorts film, Direct Air Capture & The Future of Climate Change*

# Letter from the President, H. Scott Walter



It is an honor to share my first letter as President of the Dreyfus Foundation. To begin, I would like to acknowledge and thank previous presidents Hank Walter and Dorothy Dinsmoor, both of whom continue to serve on

the Board and make essential contributions to the Foundation's mission to advance the chemical sciences.

2020 certainly posed significant challenges to all of us, and we hope that you, your families, and your colleagues have maintained good health. At the Dreyfus Foundation, we sought to continue to provide consistent support through our grant programs while also being flexible to engage in new opportunities to serve our community.

A longstanding way the Foundation has provided this support is through the Camille and Henry Dreyfus Teacher-Scholar awards. Initiated in 1970, these awards provide talented young faculty in the chemical sciences with significant and flexible funding during the early stages of their careers. Dreyfus Teacher-Scholars are selected for their research and teaching accomplishments, the promise they show of continuing strength as independent investigators, and their commitment to education. To date, the program has recognized over 900 of the country's most promising young scientists.

The Foundation promotes scientific and educational exchange among the Teacher-Scholars through a biennial conference. Thankfully we were able to gather online in 2020 to celebrate the accomplishments of recent awardees. It was a lively session, with many of the recent Teacher-Scholars sharing news of their current research and teaching endeavors. We look forward to meeting in New York and continuing these conversations in person this October, if possible.

In 2021 we are also excited to host a symposium on Chemistry in Support of Human Health, which will feature 2019 Dreyfus Prize winner Bob Langer, on

Monday, April 12. This will be part of the spring 2021 ACS meeting, which will be held online. See the article in this report for further details on this event. We hope you will join us!

In 2020, the Dreyfus Foundation introduced a grant program that supports novel initiatives in Machine Learning in chemistry and chemical engineering. There was significant response to this call for proposals, with a wide array of innovative approaches to use this emerging technology in the chemical sciences. We are eager to continue to support this exciting field.

The Foundation also continues to offer the Jean Dreyfus Lectureship, which provides funding to bring a distinguished chemical scientist to a primarily undergraduate institution to give a series of lectures, including a talk open to the general public. COVID-19 prevented any of these lectures from being held in 2020, but the Foundation remains committed to the value that these in-person visits hold for students, faculty, and their surrounding communities.

The Dreyfus Foundation promotes the importance of chemistry to students and the public through Chemistry Shorts, a series of high-quality short documentary films that spotlight areas where chemical scientists have a critical impact on our lives. Last year we released the third film, *Direct Air Capture & The Future of Climate Change*, available at [chemistryshorts.org](http://chemistryshorts.org). Our next film will focus on the many ways that chemists make water healthy and available. Watch for it in 2021.

Looking ahead this year, we look forward to naming the next winner of the Dreyfus Prize, which is on the topic of Environmental Chemistry, this spring. The Dreyfus Foundation has a long history of promoting the important ways that chemists protect the environment, and we are pleased to continue this tradition with the 2021 Dreyfus Prize.

Thank you for reading, and best wishes to all for a productive year!

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

## Dreyfus Teacher-Scholars

With the introduction of the Teacher-Scholar Awards Program in 1970, the Camille and Henry Dreyfus Foundation launched an initiative to provide talented young faculty in the chemical sciences with significant and flexible support during the early stages of their careers. In 1993, the Foundation divided the program into two parallel awards: the Camille Dreyfus Teacher-Scholar Awards Program, aimed at research universities, and the Henry Dreyfus Teacher-Scholar Awards Program, directed at primarily undergraduate institutions. Over the past 51 years, the program has provided grants to more than 900 young scholars in recognition of their excellence in both research and teaching.

Nearly 100 videos of Teacher-Scholars are found on the Dreyfus website and YouTube channel. These include 2-3 minute videos by younger Teacher-Scholars discussing their research and its potential importance for



Irene Chen and Chase Beisel, 2018 Teacher-Scholar Symposium

a general audience, as well as in-depth talks that senior Teacher-Scholars presented at the Foundation's biennial symposium.

Through the Teacher-Scholar awards, over \$53 million has reached young researchers and academics to date, many of whom have gone on to significantly advance the chemical sciences and improve the human condition.

## Machine Learning in the Chemical Sciences & Engineering

In 2020, the inaugural awards under the Dreyfus Foundation's Machine Learning in the Chemical Sciences and Engineering program were made to eight distinguished faculty who are working to contribute new

fundamental chemical insight and innovation in the field. The eight awards, listed below, total \$789,722. The deadline for the 2021 program is April 8. For information about the application procedure, please visit [dreyfus.org](http://dreyfus.org).



**Frances Arnold**, Caltech  
*Validation and Dissemination of Machine Learning-Assisted Enzyme Engineering*



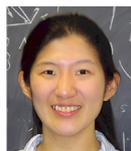
**Andrew Ferguson**, The Univ. of Chicago  
*Data-Driven Protein Engineering Using Deep Generative Learning and High-Throughput Gene Synthesis*



**Jason Goodpaster**, University of Minnesota  
*Machine Learning Models for Chemical Reactions*



**Klavs Jensen**, MIT  
*Machine-Learning-Guided Discovery of New Electrochemical Reactions*



**Yu-Shan Lin**, Tufts University  
*Low-Supervision Machine Learning for Automated Analysis of Molecular Dynamics Simulations*



**Thomas Miller**, Caltech  
*Molecular-Orbital-Based Machine Learning for Excited States*



**Brett Savoie**, Purdue University  
*Transfer Learning for Deep Generative Chemical Models*



**John Seinfeld**, Caltech  
*Application of Machine Learning to Represent the Molecular Routes Comprising Atmospheric Chemistry*

# ACS/Dreyfus Symposium on Chemistry in Support of Human Health

The Dreyfus Foundation will sponsor a symposium on Chemistry in Support of Human Health, the topic of the 2019 Dreyfus Prize, at the spring national meeting of the American Chemical Society on Monday, April 12, from 12:00 p.m. to 5:40 p.m., Eastern time. The symposium, originally scheduled to take place at the March 2020 meeting, will be held online. The distinguished speakers include Robert Langer, recipient of the 2019 Dreyfus Prize. This event is also sponsored by the ACS Multidisciplinary Program Planning Group. In sequence, the speakers will be:

**Susan Richardson**, U. of South Carolina

*The Transforming Power of Chemistry: Uncovering Emerging Water Contaminants and Making Drinking Safer*

**David Tirrell**, Caltech

*Selective Proteomic Analysis of Cellular Sub-Populations in Complex Biological Systems*

**Carolyn Bertozzi**, Stanford

*Therapeutic Opportunities in Glycoscience*

**Richard Friesner**, Columbia

*Computational Methods for Structure-Based Drug Discovery*

**Chaitan Khosla**, Stanford

*Chemical Analysis and Manipulation of Celiac Disease Pathogenesis*

**Peter Schultz**, Scripps

*Playing with the Molecules of Life*

**Sangeeta Bhatia**, MIT

*Tiny Technologies and Medicine*

**Robert Langer**, MIT

*Chemistry in Support of Human Health: Drug Delivery and Tissue Engineering*



Richardson



Tirrell



Khosla



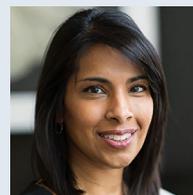
Schultz



Bertozzi



Friesner



Bhatia



Langer

## Dreyfus-Sponsored ACS Awards and Scholars Program



Katherine Franz



Lawrence Duffy

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 Disadvantaged Students into Careers in the Chemical Sciences. In 2020, these awards were made to Katherine Franz, Duke University, and Lawrence Duffy, University of Alaska, Fairbanks, 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

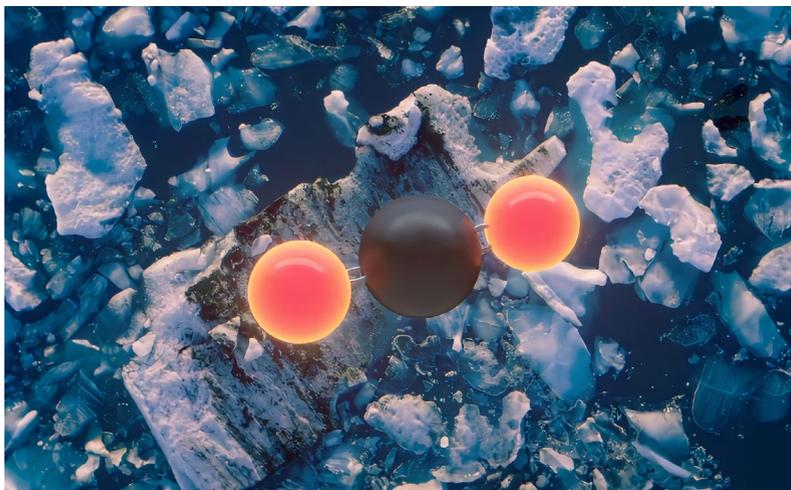
recipient, to strengthen the objectives of their award. Franz's grant was made to support Duke University's Chem Connect initiative. This program connects Duke students to issues beyond science, including promoting positive mental health in graduate school, bringing awareness to equity issues amongst scientists, and professional development for career success. Duffy directed his grant to support the Rural Alaska Honors Institute Fund, a summer program for rural and Alaska Native high school students, held at the University of Alaska, Fairbanks.



The Dreyfus Foundation is also a longstanding supporter of the ACS Scholars Program, which awards scholarships to underrepresented minority students who are majoring in undergraduate chemistry-related disciplines and are also intending to pursue careers in chemistry-related fields. The Foundation is the largest non-corporate donor to the program, having contributed over \$800,000 and supported more than 70 students since 1999.

## New *Chemistry Shorts* Film Spotlights Direct Air Capture

**C**hemistry Shorts is a film series, presented by the Dreyfus Foundation, that spotlights the positive impact 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 series has received support from the Research Corporation for Science Advancement, and is endorsed by the American Association of Chemistry Teachers, the American Chemical Society, and the American Institute of Chemical Engineers.



The third production in this series, *Direct Air Capture & The Future of Climate Change*, was launched in August 2020. The film introduces the chemistry and engineering involved in this technology, as well as the obstacles that will need to be overcome in order for it to be successful. It features commentary from several experts in academia and industry,

including Christopher Jones, the William R. McLain Chair and Professor of Chemical and Biomolecular Engineering at the Georgia Institute of Technology.

The first two films are *Rewriting Life*, which features David Liu of Harvard discussing CRISPR, and *Under the Skin*, which highlights Zhenan Bao of Stanford and her group's work on electronic skin. We invite you to view them at [chemistryshorts.org](http://chemistryshorts.org).

## News of the Board and Advisors

**A**t the 2020 annual meeting of the Foundation, H. Scott Walter was elected President of the Board of Directors. He joined the Board in 2008, and has previously served as Vice President, Treasurer, and Chair of the Finance and Audit Committee. He succeeds Henry C. Walter, who had served as President since 2009. In further news of the officers of the Board, Paul Voitach was elected Vice President, and Mary Eileen Dowling Walter was elected Treasurer.

Laura L. Kiessling, Novartis Professor of Chemistry at Massachusetts Institute of Technology, was elected an Advisor

to the Dreyfus Foundation. Kiessling's research group uses chemical biology to elucidate the biological roles of carbohydrates, with a focus on learning new mechanistic concepts. Her many awards and honors include the Centenary Prize of the Royal Society of Chemistry (2019), the Tetrahedron Prize (2018), the Alfred Bader Award in Bioinorganic or Bioorganic Chemistry (2014), a Guggenheim Fellowship (2008), a MacArthur Foundation Fellowship (1999), and a Camille Dreyfus Teacher-Scholar Award (1996). She joins Louis Brus, Arup Chakraborty, Dan Nocera, and John Rogers as Dreyfus Advisors.



H. Scott Walter



Paul Voitach



Mary Eileen Dowling Walter



Laura L. Kiessling

## Board of Directors

H. Scott Walter  
*President*

Paul Woitach  
*Vice President*

Mary Eileen Dowling Walter  
*Treasurer and Secretary*

Matthew V. Tirrell  
*Chair, Scientific Affairs Committee*

Henry C. Walter

John R. H. Blum

Edward A. Reilly

Dorothy Dinsmoor

Richard N. Zare

## Directors Emeriti

H. Marshall Schwarz

Marye Anne Fox

John I. Brauman

## Past Presidents

Camille Dreyfus, 1946-1956

Jean Dreyfus, 1956-1991

Dorothy Dinsmoor, 1991-2009

Henry C. Walter, 2009-2020

## Advisors

Louis E. Brus

Arup Chakraborty

Laura L. Kiessling

Daniel G. Nocera

John A. Rogers

## Staff

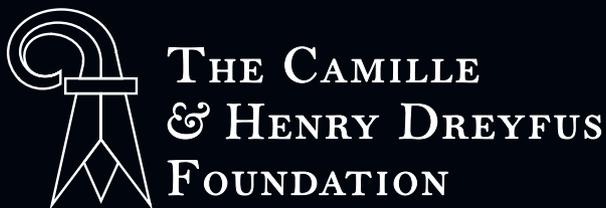
Mark J. Cardillo  
*Executive Director*

Gerard Brandenstein  
*Associate Director*

Adam Lore  
*Operations Manager*

Heather Loza  
*Office Assistant*

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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[www.dreyfus.org](http://www.dreyfus.org)

# 2020 Awards

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

L. Robert Baker, *The Ohio State University*  
Ou Chen, *Brown University*  
Emily Derbyshire, *Duke University*  
Frank Leibfarth, *The University of North Carolina at Chapel Hill*  
Ellen Matson, *University of Rochester*  
Evan Miller, *University of California, Berkeley*  
Katherine Mirica, *Dartmouth College*  
Gary F. Moore, *Arizona State University*  
Alison Narayan, *University of Michigan*  
Gabriela Schlau-Cohen, *Massachusetts Institute of Technology*  
Alexander Spokoyny, *University of California, Los Angeles*  
Steven Townsend, *Vanderbilt University*  
Suri Vaikuntanathan, *The University of Chicago*  
Christina Woo, *Harvard University*

## **Henry Dreyfus Teacher-Scholar Awards Program**

Nicholas Ball, *Pomona College*  
Katherine Berry, *Mount Holyoke College*  
Christopher Hobbs, *Sam Houston State University*  
Juan Navea, *Skidmore College*  
Kayode Oshin, *Creighton University*  
David Rider, *Western Washington University*  
John Sivey, *Towson University*  
Lindsay Soh, *Lafayette College*

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

Frances Arnold, *California Institute of Technology*  
Andrew Ferguson, *The University of Chicago*  
Jason Goodpaster, *University of Minnesota*  
Klavs Jensen, *Massachusetts Institute of Technology*  
Yu-Shan Lin, *Tufts University*  
Thomas Miller, *California Institute of Technology*  
Brett Savoie, *Purdue University*  
John Seinfeld, *California Institute of Technology*

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

The College of William & Mary  
Gettysburg College  
Kalamazoo College  
Missouri State University  
Swarthmore College  
Villanova University

## **Dreyfus-Sponsored Awards**

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

Katherine Franz, *Duke University*

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

Lawrence Duffy, *University of Alaska, Fairbanks*

# Award Programs and 2021 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 recipient of the 2021 Prize, which is conferred in Environmental Chemistry, will be announced in May.

## **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 4, 2021

The Dreyfus program for **Machine Learning in the Chemical Sciences and Engineering** provides funding for innovative projects in any area of machine learning consistent with the Foundation's broad objective to advance the chemical sciences and engineering. The Foundation anticipates that these projects will contribute new fundamental chemical understanding, insight, and innovation in the field.

*Deadline:* April 8, 2021

## **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 5, 2021

## **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 5, 2021

The Camille and Henry Dreyfus Foundation sponsors the American Chemical Society awards for **Encouraging 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, 2021