



THE CAMILLE & HENRY DREYFUS FOUNDATION

2015 in Review



Letter from the President, Henry C. Walter



When Camille and Henry Dreyfus developed polymer materials such as cellulose acetate, they made major scientific advances that also had substantial practical applications.

The groundbreaking work of Krzysztof Matyjaszewski of Carnegie Mellon University, recipient of the 2015 Dreyfus Prize in the Chemical Sciences, follows in the spirit of the Dreyfus brothers and other inventive chemists who created useful materials that have a positive impact on our daily lives.

Kris received the Dreyfus Prize *for pioneering atom transfer radical polymerization, leading this field in understanding mechanisms, and developing important new catalysts*, work that has been highly influential across a wide range of industries. In the fall we traveled to Carnegie Mellon to present Kris with the Prize, and it is always gratifying to have the ceremony take place in the festive company of the winner's colleagues, family, and friends. We were especially fortunate to have two previous Dreyfus Prize winners, Tobin Marks and Graham Cooks, in attendance for the occasion.

With each Dreyfus Prize, the Foundation sponsors a Presidential Symposium on that year's prize topic at the following national meeting of the American Chemical Society. The symposium on Making Molecules and Materials will be held at the ACS meeting in San Diego on March 15. As detailed elsewhere in this report, several distinguished leaders in this area, including Kris Matyjaszewski, will present their latest research. We hope you will be able to join us if you plan to attend the ACS meeting.

The topic of the 2017 Dreyfus Prize will be announced this fall. We look forward to

spotlighting another area of the chemical sciences that has improved human relations and circumstances, as indicated in our founding charter.

I would also like to briefly note a few milestones at the Foundation in 2015. It was the Foundation's 70th year, as well as the 45th year of the Dreyfus Teacher-Scholar Award. The Camille and Henry Dreyfus Teacher-Scholar awards have become the Foundation's flagship programs, and have supported over 800 leaders in the chemical sciences at early stages of their careers.

Last year was also the 20th year of awards made to the Postdoctoral Program in Environmental Chemistry, which supports innovative fundamental research in the chemical sciences or engineering related to the environment. More than 150 of these prestigious awards have been made to date.

We look forward to 2016 and wish you all the best for the year ahead.

Henry C. Walter



Henry C. Walter, Krzysztof Matyjaszewski, and Matthew Tirrell

Krzysztof Matyjaszewski Awarded 2015 Dreyfus Prize

Krzysztof Matyjaszewski, the J. C. Warner University Professor of Natural Sciences at Carnegie Mellon University, received the 2015 Dreyfus Prize in the Chemical Sciences, which was conferred in making molecules and materials. The international prize, awarded biennially, consists of \$250,000, a medal, and a citation. The award ceremony was held at Carnegie Mellon University on October 1, 2015, and featured a lecture by Professor Matyjaszewski, “From Molecules to Materials: Macromolecular Engineering by Taming Free Radicals.”

Matyjaszewski founded the process of atom transfer radical polymerization (ATRP), which has been cited as the most important advance in polymer synthesis in half a century. Based on ATRP, he has developed processes for efficiently synthesizing complex structured polymers and co-polymers, as well as many other important new materials. In addition to the applications of ATRP, he has led this new field in understanding mechanisms and developing new catalysts. For example, his invention of new copper complexes, over one million times more active than the original, has allowed catalysts to be reduced to parts per million levels, and has made the ATRP process sufficiently environmentally friendly that Matyjaszewski was awarded the 2009 Presidential Green Chemistry Challenge Award.

To help ensure the consequences of these major advances in polymer chemistry, Matyjaszewski has effectively transferred the ATRP process to industry, with applications that include automotive coatings, adhesives, cosmetics, inkjet printing, smart and electronic materials, and many others, with an estimated commercial value exceeding \$20 billion. “Kris Matyjaszewski’s work has made free radical polymerization a precision tool for polymer scientists to make controlled macromolecular structures, and has opened new avenues for industry in the control of polymer architecture in practical manufacturing processes,” stated Matthew Tirrell, Dean and Founding Pritzker Director of the Institute for Molecular

Engineering at the University of Chicago and Board Member of the Dreyfus Foundation.

Henry C. Walter, President of the Dreyfus Foundation, said, “Krzysztof Matyjaszewski’s work in polymer chemistry follows in the tradition of Camille and Henry Dreyfus, who were major innovators in making polymer materials. We are proud to recognize his immense accomplishments with the Dreyfus Prize.”

“I feel very honored and flattered to receive the Dreyfus Prize for making molecules and materials. This recognition addresses not only contributions of my students and collaborators but also all polymer chemists working in the area of controlled/living polymerization focused on the precise synthesis of small molecules and macromolecular materials with controlled architecture and functionality for targeted applications,” said Matyjaszewski.



Born in Poland, Matyjaszewski received his doctorate from the Polish Academy of Sciences in 1976. He completed a postdoctoral fellowship at the University of Florida and worked as a research associate at the Polish Academy from 1978 to 1984. He joined Carnegie Mellon in 1985 and was appointed the J. C. Warner Professor of Natural Sciences in 1998. He was named University Professor in 2004. Matyjaszewski also directs the Center for Macromolecular Engineering at Carnegie Mellon.



Subra Suresh, Carnegie Mellon President, and Krzysztof Matyjaszewski

Matyjaszewski has received many honors including election to the U.S. National Academy of Engineering, Fellow of the American Chemical Society, the Wolf Prize, the Marie Skłodowska-Curie Medal of the Polish Chemical Society, several American Chemical Society awards related to both Polymer Science and Engineering, the inaugural AkzoNobel North America Science award, Japanese Polymer Science and Materials Science awards, as well as other national and international honors.

Teacher-Scholar Conference, October 2016

The fourth conference for Camille and Henry Dreyfus Teacher-Scholars will be held at the New York Academy of Sciences on Friday, October 28, 2016. Approximately 40 of the most recent Teacher-Scholars will present posters of their research, bracketed by talks from four senior Teacher-Scholars. This year's speakers will be: Kristi Anseth, University of Colorado Boulder; Anthony Bishop, Amherst College; Stephen Buchwald, Massachusetts Institute of Technology; and Marsha Lester, University of Pennsylvania. The recent Teacher-Scholars will also produce two-minute videos that succinctly explain their research and its importance to the general public. These videos will subsequently be made available online.



Richard Zare and Louis Brus, 2014 Teacher-Scholar Conference

Jean Dreyfus Boissevain Lectureships

The Jean Dreyfus Boissevain Lectureship for Undergraduate Institutions provides funding to bring a leading researcher to a primarily undergraduate institution to give both popular and technical lectures in the chemical sciences, to meet with students and faculty, and to support two undergraduates in summer research. Initiated in 2010, to date the program has supported 20 lectures.

These Lectureships were held in 2015:

Peter Dervan (California Institute of Technology) at Southwestern University: “Molecular Recognition of DNA by Small Molecules” and “Transcription Factor Antagonists: From Discovery to Oncology”

Brian Kobilka (Stanford University) at St. Olaf College: “G-Protein-Coupled Receptor Signaling” and “G-Protein-Coupled Receptors: Challenges in Drug Discovery”



K. C. Nicolaou at University of North Florida

Michael Krische (University of Texas at Austin) at Allegheny College: “Molecules that Shaped the Western World: From the Spice Trade to Modern Medicine” and “Formation of C-C Bonds via Catalytic Hydrogenation and Transfer Hydrogenation”

K. C. Nicolaou (Rice University) at University of North Florida: “The Art and Science of Organic Synthesis and its Impact on Science and Society” and “Total Synthesis of Rare, Natural and Designed Molecules of Biological and Medical Importance”

Nils Walter (University of Michigan) at Trinity University: “The Origin of Life: Chemistry as the Driver of Our Evolution” and “Single R/DNA Molecules Under the Microscope”

The following public lectures are scheduled for 2016:

February 18: Daniel Schwartz (University of Colorado Boulder) at Furman University: “Biomimetic Technology – Inspired by Nature”

March 7: Timothy Swager (MIT) at Harvey Mudd College: “Organic Electronics for Chemical Sensing”

March 9: Sharon Hammes-Schiffer (University of Illinois at Urbana-Champaign) at University of Colorado Denver: “Enzymes: The Engines of Biology”

April 14: David Milstein (Weizmann Institute of Science) at Carleton College: “Sustainability Through Catalysis”

April 28: Robert Bergman (University of California, Berkeley) at Albright College: “Irreproducibility in the Scientific Literature: How Often Do Scientists Tell the Truth, the Whole Truth and Nothing but the Truth”

Camille and Henry Dreyfus Lectureship at University of Basel

The Foundation honors the heritage of the Dreyfus brothers and promotes scientific exchange between U.S. and Swiss chemists through the Dreyfus Lectureship at the University of Basel, where Camille and Henry Dreyfus were awarded their Ph.Ds. Last year there were two Dreyfus lecturers: Marye Anne Fox, Distinguished Professor of Chemistry and Biochemistry at the University of California, San Diego, and Director of the Dreyfus Foundation; and Chad Mirkin, the George B. Rathmann Professor of Chemistry at Northwestern University. Fox's talks were "The Scientific Workforce in the 21st Century: Perils and Promises" and "Controlled Photocatalysis: Photoinduced Electron Transfer." Mirkin presented "Nanotechnology: Learning to Think Big in a Field Focused on the Small" and "Spherical Nucleic Acids as Programmable Atom Equivalents: Constructing a New 'Table of the Elements.'"



Chad Mirkin, Marye Anne Fox, and Antonio Loprieno, Rector, University of Basel

ACS Presidential/Dreyfus Symposium: Making Molecules and Materials



The Dreyfus Foundation is sponsoring a Presidential Symposium on Making Molecules and Materials at the national meeting of the American Chemical Society in San Diego on Tuesday, March 15. In sequence the speakers are Frances Arnold, Joseph DeSimone, Chad Mirkin, Mounqi Bawendi, Melanie Sanford, David Tirrell, Craig Hawker, and Krzysztof Matyjaszewski. Among the topics to be covered are alternative enzymes, novel 3-D printing, nanoscience, making biomolecules, new synthesis techniques, and cutting edge synthesis and uses of polymers.

Dreyfus-Sponsored ACS Awards



Catherine Middlecamp, Diane Grob Schmidt, ACS President, and E. Ann Nalley

Since 1998, the Dreyfus Foundation has sponsored two annual awards that are administered by the American Chemical Society: Encouraging Women into Careers in the Chemical Sciences and Encouraging Disadvantaged Students into Careers in the Chemical Sciences. In 2015, these awards were made to E. Ann Nalley, Cameron University, and Catherine Middlecamp, University of Wisconsin-Madison, respectively.

The awards consist 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 the award. Nalley directed her grant to support student attendance at a scientific meeting and to support Cameron University's 2016 residential summer science academy for high school and middle school girls. Middlecamp's grant will support the Chemistry Learning Center Discretionary Fund at the University of Wisconsin-Madison.

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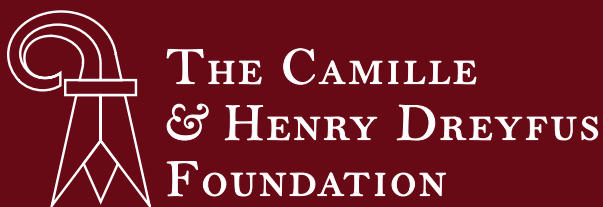
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The mission of the Camille and Henry Dreyfus Foundation is *to advance the science of chemistry, chemical engineering, and related sciences as a means of improving human relations and circumstances throughout the world.* Established in 1946 by chemist, 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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2015 Awards

Dreyfus Prize in the Chemical Sciences

Krzysztof Matyjaszewski, *Carnegie Mellon University*

Camille Dreyfus Teacher-Scholar Awards Program

Emily Balskus, *Harvard University*

Shannon Boettcher, *University of Oregon*

Jennifer Dionne, *Stanford University*

Joshua Goldberger, *The Ohio State University*

André Hoelz, *California Institute of Technology*

Michael Jewett, *Northwestern University*

Wei Min, *Columbia University*

Douglas Mitchell, *University of Illinois at Urbana-Champaign*

David Nicewicz, *The University of North Carolina at Chapel Hill*

Bradley Olsen, *Massachusetts Institute of Technology*

Gary Patti, *Washington University*

Jennifer Prescher, *University of California, Irvine*

Joseph Subotnik, *University of Pennsylvania*

Henry Dreyfus Teacher-Scholar Awards Program

Scott Brewer, *Franklin and Marshall College*

Andrea Holmes, *Doane College*

Jeffrey Johnson, *Hope College*

Dipannita Kalyani, *St. Olaf College*

Casey Londergan, *Haverford College*

Jonathan Scheerer, *The College of William and Mary*

P. Clint Spiegel, *Western Washington University*

Postdoctoral Program in Environmental Chemistry

Zhenan Bao, *Stanford University*

Neil Donahue, *Carnegie Mellon University*

Thomas Hamann, *Michigan State University*

Marc A. Hillmyer, *University of Minnesota*

Thomas Kempa, *The Johns Hopkins University*

Thuc-Quyen Nguyen, *University of California, Santa Barbara*

Eric Schelter, *University of Pennsylvania*

Jenny Yang, *University of California, Irvine*

Senior Scientist Mentor Program

Edward Cussler, *University of Minnesota*

Raymond Dessy, *Virginia Polytechnic Institute and State University*

Susan Jackels, *Seattle University*

Richard Kirchner, *Manhattan College*

Terry Miller, *The Ohio State University*

Joseph Sherma, *Lafayette College*

Kenneth Suslick, *University of Illinois at Urbana-Champaign*

Claude Yoder, *Franklin and Marshall College*

Jean Dreyfus Boissevain Lectureship for Undergraduate Institutions

Albright College

Furman University

Harvey Mudd College

Washington and Jefferson College

Western Washington University

Award Programs and 2016 Deadlines

The Dreyfus Prize in the Chemical Sciences,

awarded biennially, consists of a monetary award of \$250,000, a medal, and a citation. 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.

Announcement of topic: fall 2016

Deadline: early 2017



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 \$75,000.

Deadline: February 10, 2016

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 \$60,000.

Deadline: May 18, 2016

The Postdoctoral Program in Environmental Chemistry

is intended to further the development of scientific leadership in the field of environmental chemistry. The award provides a principal investigator with \$120,000 over two years to appoint a postdoctoral fellow in environmental chemistry.

Deadline: August 1, 2016

The Senior Scientist Mentor Program supports emeritus faculty who maintain active research programs with undergraduates in the chemical sciences. The award provides \$20,000 over two years for undergraduate stipends and modest research support.

Deadline: May 18, 2016 (note deadline shift)

The Jean Dreyfus Boissevain 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. 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: May 18, 2016