Letter from the President, Henry C. Walter

Last September we honored R. Graham Cooks of Purdue University as the third recipient of the biennial Dreyfus Prize in the Chemical Sciences, conferred in chemical instrumentation in 2013. He was cited *for his groundbreaking innovations in mass spectrometry that have profoundly enriched analytical chemistry*. It was especially gratifying to see such a large and enthusiastic turnout from the Purdue community to honor Graham's accomplishments. His award address, "Measuring Molecules: Grocery Stores, Doctors' Offices, Crime Scenes, Operating Rooms, and Factory Floors," which is now streaming on the Dreyfus Web site, included a live demonstration (pictured on the cover of this report) of the portable mass spectrometer that he has developed. The applications of this innovation cover a wide range of areas with potentially major impacts, admirably reflecting the Dreyfus charter.

Graham Cooks will also be among the speakers who will present their research at a Presidential Symposium on Chemical Instrumentation at the national meeting of the American Chemical Society in Dallas on March 18, 2014. The distinguished chemists scheduled to speak represent major contributors to the field: David Chandler, Michael Fayer, Wayne Hendrickson, Wilson Ho, Ann McDermott, W. E. Moerner, and Lloyd Smith. The Dreyfus Foundation is pleased to support this symposium and hope you will be able to join us.

Both of the Dreyfus brothers received their Ph.D. degrees in chemistry from the University of Basel at the start of the last century. The Foundation has commemorated this heritage by establishing a Lectureship at Basel. The first speaker chosen was George Whitesides of Harvard University. Details regarding his lectureship are described in this report.

The Foundation's roster of Advisors will rotate in 2014, as the term of John Tully of Yale University will conclude in April. The Board thanks John for eight years of his contributions, carried out with the highest standards, broad knowledge, and insight. We are pleased that Louis Brus of Columbia University has agreed to serve as an Advisor, joining David Hansen of Claremont McKenna, Pitzer, and Scripps Colleges, Francois Morel of Princeton University, and JoAnne Stubbe of Massachusetts Institute of Technology.

As 2013 drew to a close, we received the sad news that Harry Wasserman passed away. Harry was associated with the Foundation for more than 40 years, serving as a Board member, Advisor, and always a friend. He was instrumental in the creation of the Teacher-Scholar awards, which became the Foundation's flagship programs. All of us at Dreyfus will miss Harry, though his legacy and influence will continue to be felt here at the Foundation.

Finally, in my letter for the 2012 Year in Review I wrote about Camille and Henry Dreyfus, and their research. Last year the Foundation produced a brief video that elaborates on this theme and also describes the origin and history of the Dreyfus Foundation. It includes archival footage and photographs, as well as commentary from several members of the Board. This video is found on the Foundation Web site. I hope you will enjoy it, and wish you all the best for a fruitful 2014.

Henry C. Walter

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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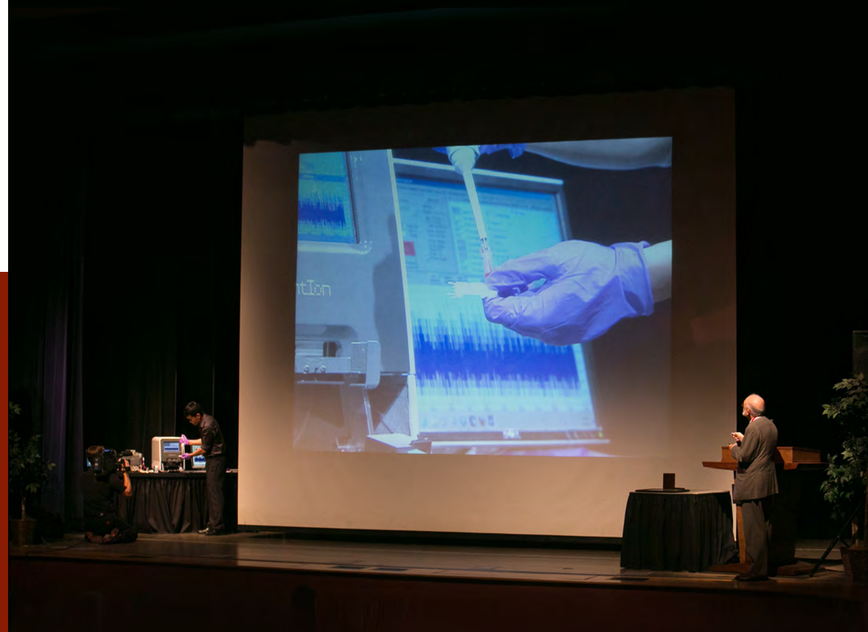
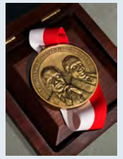
2013 in Review



Graham Cooks Awarded 2013 Dreyfus Prize



R. Graham Cooks, the Henry Bohn Hass Distinguished Professor of Chemistry at Purdue University, is the recipient of the 2013 Dreyfus Prize in the Chemical Sciences, which was conferred in chemical instrumentation. The international prize, awarded biennially, consists of $250,000, a citation, and a medal. The award ceremony was held at Purdue University on September 24, 2013, and featured a lecture by Professor Cooks.

Graham Cooks is recognized internationally as an innovative giant in the field of mass spectrometry who has enriched analytical chemistry in unparalleled ways. Virtually every pharmaceutical and biotechnology company relies on mass spectrometry at a level that has become possible through his innovations.

Mass spectrometry, the science of accurately determining the masses of molecules in a sample, yields the elemental composition of each constituent molecule. Cooks advanced this analytical capability with the introduction of tandem mass spectrometry in which selected ions generated from complex mixtures are further fragmented and the masses of the fragment ions determined. By putting together these puzzle pieces, a picture emerges of the molecular structure of the parent ion. Cooks has also made groundbreaking advances in ambient desorption/ionization in which ions from a sample at room temperature in air are introduced into the mass spectrometer for analysis. This removes many of the difficulties associated with sample preparation and volatilization in previous complex mass spectrometric techniques and broadens the application space of the technique.

In a remarkable accomplishment, Cooks and colleagues have recently created miniature mass spectrometers, enabling the remote deployment of these analytical instruments including under battery power. Mass spectrometers, once roughly as large as an automobile, can now be reduced to shoebox size, allowing their widespread use in clinics, homeland security, the military, and food safety. One noteworthy application of this instrument is a collaboration at Brigham and Women's Hospital in Cambridge, Massachusetts, in which a real-time, rapid determination of the edges of cancerous tumors is made during brain surgery.

Cooks noted, "We are trying to take powerful and sophisticated instruments out of the lab and into the real environment where, for example, they could monitor fresh produce all along the supply chain, from production to the consumers. This technology has the capability of testing for bacteria in only a matter of minutes as opposed to hours or even days for standard laboratory tests."

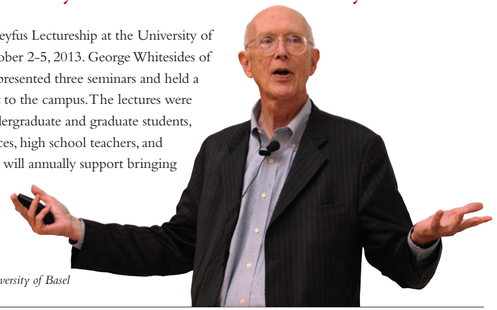
Cooks described the Dreyfus Prize as a major career highlight. "I am particularly pleased that the Dreyfus Foundation chose chemical instrumentation as the topic of the prize," Cooks stated, "because it is an emphatic recognition of the importance of instrumentation in the chemical sciences."

Richard N. Zare, the Marguerite Blake Wilbur Professor in Natural Science at Stanford University and a Board member of the Dreyfus Foundation, remarked, "Mass spectrometry has had an extraordinary impact on modern science, and Graham Cooks has changed the field in many important ways. He has developed critical new experimental instruments and methods and applied them to solve significant problems."

R. Graham Cooks and Henry Walter, President of the Dreyfus Foundation

George Whitesides Inaugural Dreyfus Lecturer at University of Basel

The first annual Camille and Henry Dreyfus Lectureship at the University of Basel in Switzerland was held on October 2-5, 2013. George Whitesides of Harvard University, the inaugural lecturer, presented three seminars and held a scientific writing workshop during his visit to the campus. The lectures were widely attended by a diverse audience that included undergraduate and graduate students, professors from many different departments in the sciences, high school teachers, and journalists. The Camille and Henry Dreyfus Lectureship will annually support bringing a leading U.S. chemist to Basel to deliver a series of talks and meet with students and faculty.



George Whitesides at the University of Basel

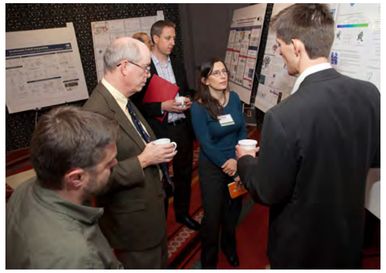
Postdoctoral Program in Environmental Chemistry

The Postdoctoral Program in Environmental Chemistry continues to attract a great variety and number of exciting proposals. The topics of this year's selections for awards include research on: use of polymer-based photonic crystals for cooling; innovative water purification chemistry; dynamics of dye-sensitized charge injection and multiexciton generation in solar cells; the interactions of microbes with clouds and climate; conductive metal-oxide frameworks for photovoltaics; isoprene-based aerosol chemistry; and Bi-based catalysis for CO_2 reduction.

Of the 116 postdoctoral fellows who have completed the Dreyfus program, approximately 90% have gone on to positions in the environmental field.

Teacher-Scholar Conference to be Held in October 2014

The third conference for Camille and Henry Dreyfus Teacher-Scholars will be held at the New York Academy of Sciences on October 24, 2014. 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: Emily Carter, Founding Director, Andlinger Center for Energy and the Environment, Princeton University; Leroy Hood, President and co-founder, Institute for Systems Biology; Stephen Lippard, Arthur Amos Noyes Professor, Massachusetts Institute of Technology; and David Oxtoby, President, Pomona College. Sanjay Sarma, the Director of Digital Learning at Massachusetts Institute of Technology, will also make a presentation on the latest developments in digital learning and the impact of MOOCs in higher education.



Poster session at 2012 Teacher-Scholar conference

Jean Dreyfus Boissevain Lectureships

The Jean Dreyfus Boissevain Lectureship Program brings leading researchers to primarily undergraduate institutions to give both popular and technical lectures in the chemical sciences, and to meet with faculty and students. The award also supports the summer research of two undergraduate students. The following Lectureships were held in 2013:

- **Bard College**–Lecturer: Robert Grubbs, California Institute of Technology: "Green Chemistry: Examples from Catalysis" and "Design and Applications of Selective Olefin Metathesis Catalysts"
- **Colgate University**–Lecturer: Geert-Jan Boons, University of Georgia: "Cancer Vaccines and Carbohydrates" and "A Fully Synthetic Multicomponent Vaccine for Cancer"
- **Eastern Michigan University**–Lecturer: John C. Warner, Warner Babcock Institute for Green Chemistry: "Green Chemistry: The Missing Element" and "Entropic Control in Materials Design"
- **University of St. Thomas**–Lecturer: Jay Keasling, University of California, Berkeley: "Life 2.0: Engineering Biology for Sustainable Development" and "Advanced Fuels from Advanced Plants"
- **Villanova University**–Lecturer: Daniel Nocera, Harvard University: "The Global Energy Challenge," "Chemistry of Solar Fuels," and "The Artificial Leaf"

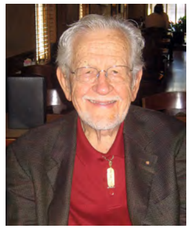
Robert Grubbs with Bard College students

Dreyfus-Sponsored ACS Awards

Since 1998, the Dreyfus Foundation has sponsored two annual awards that are administered by the American Chemical Society: for Encouraging Women into Careers in the Chemical Sciences and for Encouraging Disadvantaged Students into Careers in the Chemical Sciences. In 2013, these awards were made to Heather Allen, The Ohio State University, and George H. Fisher, Barry University, 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 its activities in meeting the objectives of the award.

Heather Allen and George H. Fisher

Senior Scientist Mentor Program



John D. Roberts

The Dreyfus Foundation's Senior Scientist Mentor Program supports faculty who maintain active research programs in the chemical sciences. The purpose of the award is to encourage emeritus faculty members to take on undergraduates to do research under their guidance. The emeritus scientists receive grants of $10,000 annually for two years ($20,000 total) to be used primarily for undergraduate stipends. More than 130 awards have been made since the program's inception in 2000.

Beneficiaries of this program include the undergraduates, who are able to learn under the direct guidance of a mentor who has a lifetime of knowledge and experience; the Senior Scientist, who as an emeritus faculty typically no longer works with graduate students or teaches courses, stays active and integrated within the university; and the institution, which is able to offer broader options for undergraduates who want to conduct research.

Among the many esteemed chemists who have been supported by this award are: John D. Roberts of California Institute of Technology, James Dye of Michigan State University, Theodore Cohen of University of Pittsburgh, Esther Conwell of University of Rochester, Norman Craig of Oberlin College, and Joseph Sherma of Lafayette College.