National Science Foundation
WHERE DISCOVERIES BEGIN

NSF CURRENT
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Each month, the *NSF Current* newsletter highlights research and education efforts supported by the National Science Foundation. If you would like to automatically receive notifications by e-mail or RSS when future editions of *NSF Current* are available, please use the links below:

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NSF AT WORK

NSF Takes Steps to Ensure Professional Research Ethics

The America COMPETES Act requires that "each institution that applies for financial assistance from the Foundation for science and engineering research or education describe in its grant proposal a plan to provide appropriate training and oversight in the responsible and ethical conduct of research to undergraduate students, graduate students and postdoctoral researchers participating in the proposed research project."

The new online resource center will provide comprehensive access to resources related to ethics. Credit: © 2010 Jupiter Images Corporation

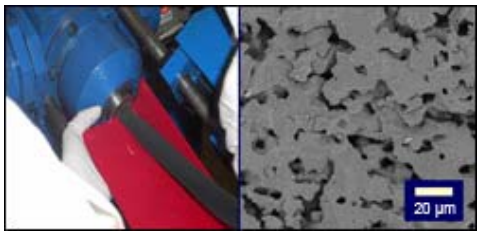
NSF has always placed a premium on professional and ethical conduct, and the Foundation's implementation plan requires each university to develop an ethics training program for students and postdoctoral fellows and include it in proposals submitted to NSF.

The agency has taken a leadership role in ensuring that institutions have the resources and expertise to meet this mandate and provide high quality ethics training for scientists and engineers. NSF has made one five-year, $5 million award to the University of Illinois at Urbana-Champaign to support a multidisciplinary team of researchers to create an electronic resource center that develops, compiles and maintains resources related to ethics in science, math and engineering. The resource will be of value to educators, students, administrators, and practicing scientists and engineers. Read more about this **work**.

Funding Bolsters Research Infrastructure

NSF has funded seven research projects which will boost science and engineering research in Arkansas, Louisiana, Nebraska, Puerto Rico, Rhode Island, Tennessee and West Virginia. Each received an investment of $20 million for five years as part of NSF's Experimental Program to Stimulate Competitive Research (EPSCoR). These awards provide support for jurisdictions that have less extensive scientific infrastructures and have historically received fewer federal research dollars. The research projects span a range of disciplines, including alternative energy research,

Ceramics Convert Waste Into Fuel



NexTech Materials of Lewis Center, Ohio, has developed a new ceramic catalyst material that will allow efficient

Arkansas scientist Elizabeth Hood studies plant biosynthesis in support of identification of renewable energy resources. Credit: Arkansas Science and Technology Authority.

nanotechnology, and marine biology and ecology. Additionally, each award includes education and outreach initiatives designed to leverage this research investment and add to the education and training opportunities in these geographic areas. Read more about these **awards**.

conversion of biomass waste into useful energy and fuels. When turning biomass into fuel, a by-product of tar is created that hampers the performance of the renewable energy processing systems. The new ceramic material (shown above in cylinder form, left, and in close-up, right) acts to efficiently remove the tar by-product and convert it into useful energy. NexTech Materials' research is funded in part through NSF's **Small Business Innovation Research program**. Credit: NexTech Materials

Tech Transfer Program Successfully Boosts Economy and Entrepreneurship

ACTiVATE®
Achieving the Commercialization of Technology in Ventures through Applied Training for Entrepreneurs

Credit: Path Forward Center for Innovation and Entrepreneurship

University research has the power to create business success stories through technology transfer. One successful technology transfer program--the **ACTiVATE** program launched at the University of Maryland, Baltimore County--combines technology transfer with the goal of improving the representation of women entrepreneurs in the science and technology sectors. Originally funded in 2005 by a grant from NSF's Partnerships for Innovation program, ACTiVATE helps mid-career women start businesses by licensing technologies from universities and government labs.

ACTiVATE has already seen many successes. In 2008, the program was awarded the "Best Specialty Entrepreneurship Program" by the U.S. Association of Small Business and Entrepreneurship, and has been recognized as a "best practice" internationally. ACTiVATE program graduates have launched over 25 companies in the Maryland area. Additionally, a recent independent economic impact study found that ACTiVATE program graduates generate more than $400,000 in state and local taxes annually and the program itself costs only $15,600 per job created.

The program was recently licensed into the **Path Forward Center for Innovation and Entrepreneurship**, a new nonprofit co-founded by former instructors in the program. Plans are in place to expand this program to other technology-rich areas across the U.S. as well as internationally.

Did You Know?

Cumulonimbus cloud with a rain shaft, an area in the cloud where it is raining. Credit: University Corporation for

Not all clouds are built alike; some types of clouds cool the Earth while others contribute to the Earth's warming. According to the 1997 Intergovernmental Panel on Climate Change, clouds are "the largest source of uncertainty" in predictions of climate change. Thus, scientists are studying several aspects of clouds in order to understand their potential effects on global warming. A variety of tools and techniques allow atmospheric scientists to take cloud samples and analyze cloud composition from both the land and sky. This research not only provides information about how clouds form and generate precipitation, but is also used in developing computer models to predict the role of clouds in climate change.

Atmospheric Research

For in-depth articles, videos and images about clouds and climate change, view the NSF special report, titled "**Clouds: The Wild Card of Climate Change**."

Faces of NSF Research

2010 Nobel Prize Winners Supported by NSF

Among the 2010 Nobel laureates announced in October, four of these honored scientists have been supported by NSF: Richard F. Heck and Ei-ichi Negishi (Nobel laureates in Chemistry) and Peter A. Diamond and Dale Mortensen (Nobel laureates in Economics). Now, a total of 191 U.S. and U.S.-based researchers have had their research pursuits funded by NSF before going on to become Nobel laureates.

NSF-supported 2010 Nobel winners, clockwise from top left: Richard Heck, Ei-ichi Negishi, Peter Diamond and Dale Mortensen. Credits: University of Delaware; Purdue News Service; Massachusetts Institute of Technology; Lars Kruse/Aarhus University

Heck of the University of Delaware and Negishi of Purdue University were honored alongside Akira Suzuki of Hokkaido University in Japan for their work in carbon chemistry. Heck, Negishi and Suzuki found new ways to bond carbon atoms together in a more efficient and precise manner by using a palladium atom for the chemical reaction. This innovation in "palladium-catalyzed cross couplings" has given the world new medicines and revolutionary materials such as plastics, and these award-winning scientific methods are now widely used in pharmaceutical, agricultural and electronics industries. NSF has funded Heck and Negishi multiple times since 1977 and 1980, respectively, for the research that set the groundwork for developing these methods.

Peter Diamond of the Massachusetts Institute of Technology and Dale Mortensen of Northwestern University were awarded the Nobel Prize in Economics alongside Christopher Pissarides of the London School of Economics. Over the past three decades, Diamond and Mortensen have both received multiple NSF awards. Awards to Mortensen also included support for his collaborative research with Pissarides. The laureates were recognized for their work in understanding how markets work with "search frictions," a term describing a market in which buyers and sellers do not have enough information to immediately identify each other. Their theory is widely used to predict the effects of real-world policy tools such as unemployment insurance, and the theory of markets with search frictions has a wide range of other applications across many other fields of economics, as well.

For more about NSF-funded Nobel Prize winners, past and present, visit this **fact sheet** and **special report**.

NSF in the News

Molecular Mimicry: Plastic, Steel Line up Like Kin (*National Public Radio*) Frank Bates, chemical engineer and materials scientist at the University of Minnesota, is profiled for his novel work on molecule packing in plastics and metals. Similarities in particle packing suggest a universal property of nature links these seemingly dissimilar materials.

Science Grows on Acquiring New Language (*Education Week*) This article on the science of language acquisition discusses the new work shaping this research field, and highlights NSF-funded collaborations between educators, cognitive scientists, neuroscientists, psychologists and linguists.

Future Droughts Will Be Shockers, Study Says (*MSNBC*) A recently published NSF-funded study forecasts that droughts will occur in the U.S. and worldwide within the next 30 years, and that by the year 2100, the U.S. will experience a drought twice as severe as the most severe drought in recent history.

Interactive Fun at the USA Science and Engineering Expo

Guitar Hero with Physics. Doppler on Wheels. Earthquake-resistant building construction. These were just a few of the interactive exhibits showcasing NSF-funded research at the USA Science and Engineering Expo in Washington, D.C., on October 23 and 24. NSF sponsored 15 hands-on science booths, with exhibitors selected from a pool of grant recipients eager to showcase their ability to translate their scientific research to a broad audience.

Credit: US Science & Engineering Festival

Visitors to the "Adventures of a Storm Chaser" exhibit were able to sit at the controls of the Doppler on Wheels, which is the mobile weather radar facility that NSF scientists use to gather up-close data on tornadoes, hurricanes, wild fires, winter storms and other severe weather events.

"Rollin' and Shakin' on the Richter Scale" exhibit. Credit: NSF

At the "Science Made Fun for Middle Schoolers" exhibit, visitors answered physics questions correctly to earn notes in a Guitar Hero-like game that Ohio University researchers, recipients of NSF's Graduate STEM Fellows in K-12 (GK-12) Education grants, created to engage middle schoolers.

"Rollin' and Shakin' on the Richter Scale," an exhibit hosted by the NSF-sponsored consortium NEES (Network for Earthquake Engineering Simulation), encouraged kids to try to create strong buildings using wooden blocks. At a nearby "shake table," they could see which components of a toy structure allowed it to withstand a simulated earthquake.

The expo drew approximately 500,000 people.

NSF Japan Office Celebrates Fifty Years of Collaborative Research and Scientific Diplomacy

NSF recently celebrated the 50th anniversary of its Tokyo Office. National Science Board Chairman Ray Bowen called the history of U.S.-Japan relations, "... a magnificent story of international cooperation among nations, among research agencies within nations and, perhaps more importantly, among the people of our two nations. In a larger sense, it is a story of the internationalization of science and the growth of scientific and educational strength in our world."

Over half a century, U.S. and Japanese researchers have developed productive partnerships in all areas of science and engineering, engaging in collaborations which pay dividends to both societies, including: the Japan Summer Institute for Graduate Students (part of the **East Asia and Pacific Summer Institutes**), **Integrated Ocean Drilling Program** (IODP), **Network for Earthquake Engineering Simulation** (NEES) and the **Atacama Large Millimeter/submillimeter Array** (ALMA).

National Medal of Science Laureates Announced

Credit: NSF

On October 14, President Obama announced the 2009 awardees of the National Medals of Science and National Medals of Technology and Innovation. The National Medal of Science was created by statute in 1959, and is administered for the White House by NSF. The National Medal of Technology and Innovation has been awarded annually since 1980, and is administered for the White House by the U.S. Department of Commerce's U.S. Patent and Trademark Office. Read more about the medals and see the full list of winners in this **NSF press release**.

The National Science Foundation (NSF) is an independent federal agency that supports fundamental research and education across all fields of science and engineering. In fiscal year 2010, its budget is $6.9 billion. NSF funds reach all 50 states through grants to over 1,900 universities and institutions. Each year, NSF receives about 48,000 competitive requests for funding, and makes over 11,300 new funding

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