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## **New Report Explores Nanotechnology's Future** *From Advanced Healthcare to Clean Energy, Nanotech Promises Long-Term Benefits*

WASHINGTON, DC—Controlling the properties and behavior of matter at the smallest scale—in effect, “domesticating atoms”—can help to overcome some of the world’s biggest challenges, concludes a new report on how diverse experts view the future of nanotechnology. Released today, *NanoFrontiers: Visions for the Future of Nanotechnology*, summarizes discussions among over 50 scientists, engineers, ethicists, policymakers, and other experts, as well as information gathered in follow-up interviews and from specially prepared background papers, about the long-term potential of nanotechnology.

Written by freelance science writer Karen F. Schmidt, the report examines several compelling opportunities for significant, widespread benefit, focusing on nanotechnology’s ability to address the “energy crisis, the need for better medical treatments, and the demand for clean water.” Synthesizing perspectives offered at a two-day NanoFrontiers Workshop held in February 2006, the report aims to “provide a glimpse into a vast new world of technological possibilities and to stimulate broader discussion of the goals and vision for nanotechnology in both scientific and public realms.”

The report is the product of a forecasting and awareness-raising activity sponsored by the National Science Foundation (NSF), National Institutes of Health (NIH), and the Project on Emerging Nanotechnologies, which is an initiative of the Woodrow Wilson International Center for Scholars and The Pew Charitable Trusts.

The report—along with the first in a series of related podcasts—is available online at [www.nanotechproject.org/114](http://www.nanotechproject.org/114).

“This report is a window onto the future of nanotechnology. It looks at what is coming down the road and what we need to do *now* to prepare for and harness its potential,” said David Rejeski, director of the Project on Emerging Nanotechnologies at the Wilson Center. “These foresight exercises are critical to understanding the long-term advantages and challenges posed by the applications of nanotechnology.”

Nanotechnology is still very much a work in progress, with the potential to deliver a range of benefits today and for many decades to come. For example, most first-generation nanomedicines, according to the report, are reformulations of existing drugs, usually modified to enable new methods of delivery inside the body. However, farther down the road, experts predict the creation of novel nanostructures that could serve as new kinds of drugs for treating cancer, Parkinson’s and cardiovascular disease.

Researchers also are working toward engineered nanomaterials for use as artificial tissues that will replace diseased kidneys and livers, and even repair nerve damage. “Nanotechnology can be used very effectively to extract critical information about the inception of the disease process at the level of the molecule and the atom, and as such, it presents us with a huge horizon of exploration,” NIH Director Elias Zerhouni observed at the workshop.

The report envisions a similar progression of nanotechnology-enabled efforts to produce clean water and energy across the globe. Today, nanotechnology is delivering promising methods for cleaning up polluted sites and for monitoring water supplies. Tomorrow, it could provide the technical means for economical community-based systems that treat water at its point of use. Similarly, new solutions to the world's energy problems are also possible using nanotechnology, ranging from improving the efficiency in production, storage, and transmission of fossil-fuel-based sources of energy to overcoming many of the obstacles to a hydrogen-based transportation system with fuel-cell powered cars and trucks, helping to render fossil fuels obsolete as an energy source.

Relevant to nearly every industry, nanotechnology is considered a “platform technology,” the report says, because “it readily merges and converges with other technologies and could change how we do just about everything.” The report singles out advances in three underpinning technical areas—research tools, information management, and assembly and manufacturing—as fundamental to progress across the entire spectrum of nanotechnology research and development needs.

“Nanotechnology is in an early phase of development and, as of now, only relatively rudimentary nanostructures are being used to make improvements in existing materials and systems,” noted Mihail Roco, NSF senior advisor for nanotechnology. “We are aiming at the systematic control of matter at the nanoscale to create revolutionary new generations of products and nanosystems as the primary foundation for converging and emerging technologies. For this reason, we need a transformative, responsible and anticipatory global governance approach for nanotechnology that involves both researchers and the public across many countries, scientific and engineering domains.”

The **National Institutes of Health (NIH)**—*The Nation's Medical Research Agency*—includes 27 Institutes and Centers and is a component of the U.S. Department of Health and Human Services. It is the primary federal agency for conducting and supporting basic, clinical and translational medical research, and it investigates the causes, treatments, and cures for both common and rare diseases. For more information about NIH and its programs, visit [www.nih.gov](http://www.nih.gov).

The **National Science Foundation (NSF)** is an independent federal agency that supports fundamental research and education across all fields of science and engineering, with an annual budget of \$5.6 billion. For more information, visit [www.nsf.gov/nano](http://www.nsf.gov/nano).

The **Project on Emerging Nanotechnologies** is an initiative launched by the **Woodrow Wilson International Center for Scholars** and **The Pew Charitable Trusts** in 2005. It is dedicated to helping business, government and the public anticipate and manage possible health and environmental implications of nanotechnology. For more information about the project, log on to [www.nanotechproject.org](http://www.nanotechproject.org).

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