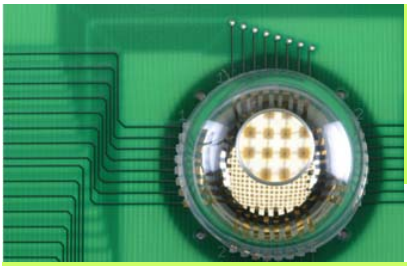
# Economic Prosperity Through Science and Engineering Research

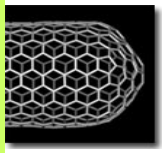
- **Many discoveries come from federally-funded research and development (R&D).**
- **Thanks to forward-looking and essential investments in R&D in the American Recovery and Reinvestment Act and fiscal year 2009 appropriations, discoveries and innovations will increase our skilled workforce, drive economic growth and enhance the environment.**
- **Steadfast commitment to stable and robust federal R&D in 2010 and beyond will ensure U.S. competitiveness in the global marketplace and for the global environment.**

- Economists have concluded that between 60 and 80 percent of America's economic growth over the past 50 years is attributable to technological innovation.
- A report from the Council for Chemical Research concludes that a federal investment of $1 billion in R&D funding in the chemical sciences can be leveraged into $40 billion in Gross National Product and 600,000 jobs.
- Following NSF's initial Small Business Innovation Research (SBIR) grant, Virent (see example below) was able to attract more than $30 million in follow-on investment from the private sector. In terms of direct and indirect job creation, NSF's initial $1 million SBIR investment has led to hundreds of new jobs.
- A report from Lux Research finds that $147 billion in products enabled by nanotechnology were sold in 2007. The report concludes that corporations are relying on cooperation with external innovators - universities, start-ups, or small corporations--to complement their internal nanotech research (see examples below).



**Electronic Eye**: Researchers from the University of Illinois and Northwestern have developed a flexible web of wire-connected pixels to work as an eye-like camera. The light sensor can be contoured to fit any shape without diminishing image quality. The sensor will revolutionize the photography industry and perhaps the "spy" industry.
*Credit: Beckman Institute, University of Illinois*

**Buckypaper:** Florida State University researchers, wove carbon nanotube fibers (1/50,000th the diameter of a human hair) into paper thin materials that are stronger than steel and conduct heat very well. Buckypaper is good for lightning protection, heat dissipation in electronics and lighter weight vehicles and aircraft.
*Image courtesy of Florida State University*



**Green Gasoline**: Chemical engineers at Virent Energy Systems of Madison, Wisc., a National Science Foundation (NSF) Small Business Innovation Research awardee, and researchers at the University of Wisconsin at Madison showed that sugars and carbohydrates can be processed like petroleum into the full suite of products that drive the fuel, pharmaceutical and chemical industries.

So one can turn sugar from biomass waste into gasoline and water. Note the water separated at the bottom of the flask at right.
*Credit: Virent Energy Systems, Inc.*

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- The U.S. Conference of Mayors reported that there were about 750,000 green jobs in the U.S. in 2006—a number that is projected to grow five-fold to more than 4.2 million jobs over the next three decades.
- A recent study found that California's energy-efficiency policies created nearly 1.5 million jobs from 1977 to 2007, while eliminating fewer than 25,000.
- Google employs more than 20,000 people worldwide, with downstream job creation estimated in the tens of thousands - all of it a direct benefit from NSF's initial $1 million digital libraries investment.
- Every day, Internet users from around the world use Google on average 1200 million times per day to search more than 6 billion sites in 97 different languages, contributing to a lean and green economy.
- Growing a green and lean economy requires a greater understanding of the world around us and greater computing power - federally-funded R&D gives us the best of both (see examples below).

**Greenland Melting**: Researchers from the Woods Hole Oceanographic Institution and the University of Washington have for the first time documented the sudden and complete drainage of a meltwater lake from the top of the Greenland ice sheet to its base. *Photo by Sarah Das, Woods Hole Oceanographic Institution*

**Superfast Research:** Last year computers broke the petaflop barrier, performing more than 1 quadrillion floating-point calculations per second. The "Jaguar" is one of the fastest. Petaflop supercomputing will advance science from better simulations of climate change to scramjet engines. http://www.scidac.gov/
*Photo: Cray TX "Jaguar" Supercomputer, Oak Ridge National Laboratory, Tennessee*


**Where Do You Get Your Federal Science?** Here is a short list of some of the many places to find out about today's discoveries, which will lead to tomorrow's innovations and a robust prosperity.

## Science News from U.S. Federal Agencies:

**Environmental Protection Agency** – Research and Development - http://www.epa.gov/ord/

**Department of Energy** News - http://www.energy.gov/news/index.htm

**National Aeronautics and Space Administration (NASA)** News - http://www.nasa.gov/topics/nasalife/index.html

**National Institute of Standards and Technology (NIST)** News -http://www.nist.gov/public_affairs/news.htm

**National Institutes of Health (NIH)** News - http://www.nih.gov/news/

**National Oceanic and Atmospheric Administration (NOAA)** News - http://www.noaa.gov/newsarchive.html

**National Science Foundation (NSF)** Discoveries - http://www.nsf.gov/discoveries/

**U.S. Geological Survey (USGS)** News - http://www.usgs.gov/newsroom/