



# S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

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## FEATURE ARTICLES

### [On-Demand Vaccines Possible with Engineered Nanoparticles](#)

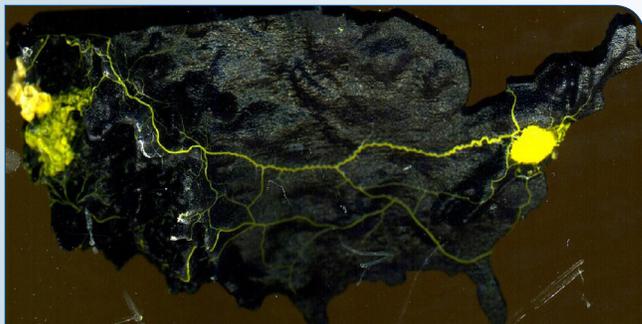
[PhysOrg.com, 07JAN2014](#)

Researchers at the University of Washington injected mice with nanoparticles synthesized using an engineered protein that both mimics the effect of an infection and binds to calcium phosphate. After eight months, mice that contracted the disease made three-fold the number of protective “killer” T-cells—a sign of a long-lasting immune response—compared with mice that had received the protein but no calcium phosphate nanoparticles. [TECHNICAL ARTICLE](#)

*Tags: Biotechnology, Medical technology, Featured Article*

### [What can slime molds offer computing?](#)

[PhysOrg.com, 03JAN2014](#)



3D terrain of the US shows slime molds as they move their protoplasmic tubes toward food sources at opposite ends of the country. Credit: Adamatzky. ©2013 IEEE

Researchers in England have shown that with slime molds they can design fully functional, and nearly general purpose, computers with almost any living substrate. No intelligence is required to compute but only basic responses to chemical, optical, tactile and maybe gravitational stimulation. The findings could have implications for image processing, graph-theoretic computing, and the synthesis of new materials, among other areas. [TECHNICAL ARTICLE](#)

*Tags: Information Technology, S&T UK, Featured Article*

### [How Emotions Are Mapped in the Body](#)

[Science Daily, 31DEC2013](#)

Researchers in Finland report that the most common emotions trigger strong bodily sensations, and the bodily maps of these sensations were topographically different for different emotions. The sensation patterns were, however, consistent across different West European and East Asian cultures. [TECHNICAL ARTICLE](#)

*Tags: Neuroscience, S&T Finland, Featured Article*

## S&T NEWS ARTICLES

### ADVANCED MANUFACTURING

#### [3D electronic printing holds promise of applications for soldiers](#)

[Printed Electronics World, 06JAN2014](#)

As researchers at Picatinny Arsenal explore the potential of 3-dimensional printing, they envision the potential to embed a radio antenna on the side of a Soldier’s helmet, or print sensors directly onto a weapon or even an article of clothing.

*Tags: Advanced manufacturing, Government S&T*

### ADVANCED MATERIALS

#### [Nanotechnology spotlights—the best of 2013](#)

[Nanowerk Spotlight, 03JAN2014](#)

Here are the 10 most popular Nanowerk Nanotechnology Spotlight articles of 2013.

*Tags: Advanced materials*

#### [Supercomputers join search for ‘cheapium’](#)

[Nanowerk, 03JAN2014](#)

In a new study, researchers from Duke University used computational methods to identify dozens of platinum-group alloys that were previously unknown to science. They could prove beneficial in a wide range of applications. [TECHNICAL ARTICLE](#)

*Tags: Advanced materials*

*continued...*

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**AUTONOMOUS SYSTEMS & ROBOTICS****Video Friday: Robot Cube, Drone Fight Club, and the Rest of 2013**

IEEE Spectrum, 03JAN2014

TU Delft's DelFly micro aerial vehicle's stereo vision system and lightweight onboard processing allows the flapping wing robot to keep itself entertained for about 10 minutes without crashing into anything, no external computers (or humans) necessary.

Tags: *Autonomous systems & robotics***BIOTECHNOLOGY****Growing human organs inside pigs in Japan**

KurzweilAI, 06JAN2014

Researchers in Japan are creating chimeric pigs, which carry genetic material from two different species. It starts off by making "a-pancreatic" embryos. Inside the white pig embryo, the gene that carries the instructions for developing the animal's pancreas has been "switched off."

Tags: *Biotechnology, S&T Japan***Nanoparticle That Mimics Red Blood Cell Shows Promise as Vaccine for Bacterial Infections**

MIT Technology Review, 03JAN2014

According to researchers at the University of California, San Diego, a nanoparticle wrapped in material taken from the membranes of red blood cells could become the basis for vaccines against a range of infectious bacteria, including MRSA. [TECHNICAL ARTICLE](#)

Tags: *Biotechnology***ENERGY****Synthetic natural gas from excess electricity**

Alphagaleo, 06JAN2014

"Power to gas" process converts short-term excess electricity from photovoltaic systems and wind turbines into hydrogen. Combined with the greenhouse gas CO<sub>2</sub>, renewable hydrogen can be used to produce methane, which can be stored and distributed in the natural gas network. Researchers in China have now succeeded in further optimising this process.

Tags: *Energy, S&T China***ENVIRONMENTAL SCIENCE****Scientists to examine Pacific's 'global chimney'**

EurekAlert, 07JAN2014

Next week NCAR scientists and partners will launch CONTRAST (Convective Transport of Active Species in the Tropics), a field project in the tropical Pacific, a remote region that holds a key to understanding worldwide climate. The warm waters fuel huge clusters of thunderstorms that act as a global chimney, lofting gases and particles into the stratosphere and influencing the climate. [CONTRAST Field Project](#)

Tags: *Environmental science, Climatology***Telecommunications expert suggests Earth may have dark matter disc**

PhysOrg.com, 03JAN2014

Researchers at the University of Texas collected data from several satellite groups which they then used to measure the mass of the Earth. Their calculations were between 0.005 and 0.008 percent greater than that described by the IAU. The difference, they said, could be explained by a very large disc of dark matter over the equator. [TECHNICAL ARTICLE](#)

Tags: *Environmental science***Climatological Software Developed for Massive Use**

Science Daily, 01JAN2014

Researchers at the University of Mexico (UNAM) make available for anyone the opportunity to know their community, state or country's weather activity for today and months ahead.

Tags: *Environmental science, Climatology***Solution to Cloud Riddle Reveals Hotter Future: Global Temperatures to Rise at Least 4 Degrees C by 2100**

Science Daily, 31DEC2013

According to researchers in the UK previous estimates of the sensitivity of global temperature to a doubling of carbon dioxide ranged from 1.5°C to 5°C. This new research takes away the lower end of climate sensitivity estimates, meaning that global average temperatures will increase by 3°C to 5°C with a doubling of carbon dioxide. [TECHNICAL ARTICLE](#)

Tags: *Environmental science, Climatology, S&T UK***FORECASTING****Responding to Capability Surprise: National Academies report**

National Academies, 07JAN2014

This report, by the National Research Council, selects a few surprises from across a continuum of surprises, from disruptive technologies, to intelligence-inferred capability developments, to operational deployments, and assesses what the Naval Forces are doing (and could do) about them.

Tags: *Forecasting, Military technology***2014 Top Tech to Watch—Special Report**

IEEE Spectrum, 02JAN2014

These include a superfast wireless system, Chinese space launches, eerily silent electric race cars, and that recurring chestnut of tech news, the jet pack.

Tags: *Forecasting*

“I was taught that the way of progress is neither swift nor easy.”

MARIE CURIE

## IMAGING TECHNOLOGY

### [ARL's 'ghost imaging' cuts through battlefield turbulence](#)

Defense Systems, 06JAN2014

The technology developed by researchers at the Army Research Laboratory uses non-local multi-photon quantum interference, related to entanglement, to cancel atmospheric turbulence and abnormalities. The method works at virtually all wavelengths for passive and active imaging. The researchers have demonstrated the experiments at a distance of 2.33km away from the target.

Tags: *Imaging technology, Government S&T*

## MATERIALS SCIENCE

### [Simple, Cheap Way to Increase Solar Cell Efficiency](#)

Science Daily, 03JAN2014

Researchers from North Carolina State University and the Chinese Academy of Sciences have found an easy way to modify the molecular structure of a polymer commonly used in solar cells. Their modification can increase solar cell efficiency by more than 30 percent. [TECHNICAL ARTICLE](#)

Tags: *Materials science, Solar energy*

## MICROELECTRONICS

### [Making silicon devices responsive to infrared light](#)

MIT News, 02JAN2014

The new system works at room temperature and provides a broad infrared response. It incorporates atoms of gold into the surface of silicon's crystal structure in a way that maintains the material's original structure. Additionally, it has the advantage of using silicon, a common semiconductor that is relatively low-cost, easy to process, and abundant. The technology could enable new infrared imaging systems and be applicable to materials useful for making solar cells.. [TECHNICAL ARTICLE](#)

Tags: *Microelectronics*

## NEUROSCIENCE

### [Behavioral economist studies science of decision-making](#)

NSF News, 06JAN2014

Using brain scans, researchers at CalTech examine people's expressed values and the choices they later make.

Tags: *Neuroscience*

### [A Novel Look at How Stories May Change the Brain](#)

Science Daily, 03JAN2014

In a study focused on the lingering neural effects of reading a narrative, Emory University researchers detected what may be biological traces related to actual changes in the brain that linger, at least for a few days, after reading a novel. [TECHNICAL ARTICLE](#)

Tags: *Neuroscience*

## PHOTONICS

### [Nanoplasmonics: Towards efficient light harvesting](#)

PhysOrg.com, 07JAN2014

Researchers in England illustrate how the general capabilities of the transformation optics technique can be used to treat the subwavelength fields that occur in plasmonic systems and review the latest developments in transformation optics as applied to nanophotonics. [TECHNICAL ARTICLE](#)

Tags: *Photonics, S&T UK*

## S&T POLICY

### [Open collaboration leading to novel organizations](#)

KurzweilAI, 06JAN2014

Open collaboration—which has brought the world Bitcoin, TEDx and Wikipedia—is likely to lead to new organizations that are not quite non-profits and not quite corporations. [TECHNICAL ARTICLE](#)

Tags: *S&T policy*

### [China will spray bacteria over 133 square kilometer over the next 5 years.](#)

Next Big Future, 04JAN2014

The goal is to slow the spread of deserts and reclaim a tiny part of 200,000 square km of desert by 2020. The bacteria creates 0.5 to 1.0 centimeter thick biocrust over the desert which helps topsoil to reform and prevents top soil erosion.

Tags: *S&T policy, S&T China*

### [U.S. Global Share of Research Spending Declines](#)

Science Daily, 01JAN2014

According to a new analysis, conducted by researchers from industry and academia, the research and development spending in the United States dropped from \$131 billion to \$119 billion from 2007-2012, while Japan increased

spending by \$9 billion and China increased by \$6.4 billion. Overall, Asia's share of spending grew from 18 percent to 24 percent. Europe held steady at 29 percent. [TECHNICAL ARTICLE](#)

*Tags: S&T policy, R&D Funding*

### [China: The Next Space Superpower](#)

[IEEE Spectrum](#), 31DEC2013

China's space program differs from those of other nations in part because of the nation's political structure: A single-party government with a bevy of strong state-owned enterprises can get a lot done. While China is just now meeting milestones that the United States and the former Soviet Union passed decades ago, the Chinese government's unflagging support means that its program is quickly catching up.

*Tags: S&T policy, Military technology, S&T China*

## FEATURED RESOURCE

### [FreeFullPDF](#)

The aim of FreeFullPDF.com is to increase the visibility and ease of use of open access scientific journals, theses, posters and patents. All scientific subjects are covered and all content are freely available in PDF format.

## SCIENCE WITHOUT BORDERS

### [Scientists find a practical test for string theory](#)

[PhysOrg.com](#), 05JAN2014

Researchers at Towson University, in Maryland, say that precise measurements of the positions of solar-system bodies could reveal very slight discrepancies in what is predicted by the theory of general relativity and the equivalence principle, or establish new upper limits for measuring the effects of string theory. [TECHNICAL ARTICLE](#)

*Tags: Science without borders*

### [Stellar Trio Could Put Einstein's Theory of Gravity to the Test](#)

[Science Magazine](#), 05JAN2014

Astronomers in Germany have found a pulsar in orbit with not one, but two other stars. The first-of-its-kind trio opens the way for testing a concept behind general relativity known as the equivalence principle, which relates two different conceptions of mass. Researchers should be able to test the principle within a year.

*Tags: Science without borders*

### [CERN gears up for new experiments](#)

[Physics World](#), 03JAN2014

The accelerators that feed protons into the LHC—the Proton Synchrotron (PS) and the Super Proton Synchrotron (SPS)—will both be fired up in the second half of 2014, which means that lots of experiments at CERN should be taking data this year, including some that are entirely new.

*Tags: Science without borders, Particle physics*

### [Spiders Spin Electric Web \(w/video\)](#)

[Science Magazine](#), 03JAN2014

The garden cross spider tailors a web containing carefully crafted patterns of water and silk that efficiently conducts electricity. The web threads are made of silk, laced with special silk "droplets" swollen with water and a special chemical cocktail that functions as a highly adhesive and water-attractant glue. This is a sticky trap that also works as a water magnet, sucking humidity from all around.

*Tags: Science without borders, Biology*

## SENSORS

### [Inverse design: New route to design a practical invisibility cloak](#)

[PhysOrg.com](#), 07JAN2014

According to researchers in China a combination of "forward designs" and "inverse designs" rather than using a single cloaking strategy is very likely to make invisibility cloaks far more realistic. [TECHNICAL ARTICLE](#)

*Tags: Sensors, S&T China*

### [How GPS Can Keep Track of Earthquakes and Flooding](#)

[MIT Technology Review](#), 06JAN2014

Over the past couple of years, researchers have discovered that GPS, when combined with sensors such as accelerometers and barometers, can be an important tool for evaluating and possibly predicting earthquakes and flash floods. Researchers from Scripps, San Diego, JPL and NOAA describe such a set up throughout Southern California.

*Tags: Sensors, Government S&T*

### [Magnetic devices: Clocking with no field](#)

[Nature Nanotechnology](#), 06JAN2014

Nanomagnet logic devices that do not require a magnetic field for clocking can now be fabricated.

*Tags: Sensors*

### [Dogs Sense Small Variations in Earth's Magnetic Field, New Research Suggests](#)

[Science Daily](#), 04JAN2014

In a study, researchers in Germany found that dogs prefer a body-alignment along the magnetic north-south axis, but only during periods of calm magnetic field conditions.

[TECHNICAL ARTICLE](#)

*Tags: Sensors, S&T Germany*

## Simulator Recreates Virtual Taste Online

Science Daily, 02JAN2014

Researchers at the University of Singapore report that signals transmitted through a silver electrode touching the tip of the tongue can produce salty, sweet, sour and bitter sensations. By combining different levels of electrical currents and varying the temperature of the electrode, simulation of the tastes can be reproduced.

*Tags: Sensors, Biotechnology* ■

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**Dr. Brian Beachkofski**  
Director, Office of  
Technical Intelligence (OTI)

**Ms. Hema Viswanath**  
OTI Corporate Librarian