



# S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

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## FEATURE ARTICLES

### [IBM Scientists First to Distinguish Individual Molecular Bonds](#)

[IBM Zurich, 14SEP2012](#)

The results push the exploration of using molecules and atoms at the smallest scale and could be important for studying graphene devices, which are currently being explored by both industry and academia for applications including high-bandwidth wireless communication and electronic displays.

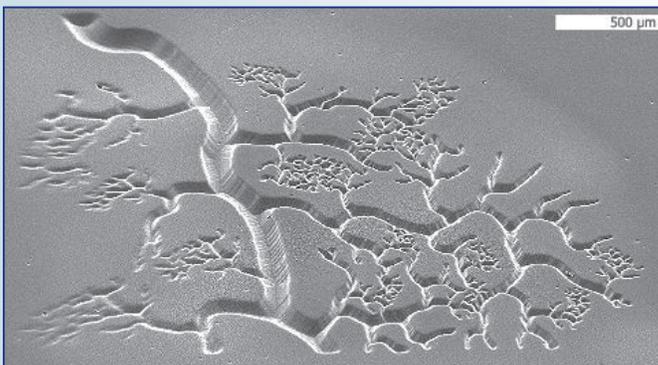
*Tags: Imaging technology, Featured Article*

### [Nanoengineers can print 3-D microstructures in mere seconds](#)

[Science Daily, 13SEP2012](#)

Nanoengineers at the University of California, San Diego have demonstrated the capability of printing three-dimensional blood vessels in mere seconds out of soft, biocompatible hydrogels. Near term, the technology could lead to better systems for growing and studying cells, including stem cells, in the laboratory. Long-term, the goal is to be able to print biological tissues for regenerative medicine.

*Tags: Advanced manufacturing, Featured Article*



*NanoEngineering Professor Shaochen Chen has demonstrated the capability of printing three-dimensional blood vessels in mere seconds out of soft, biocompatible hydrogels. Being able to print blood vessels is essential to achieving the promise of regenerative medicine because it is how the body distributes oxygen and nutrients. (Credit: Biomedical Nanotechnology Laboratory, Chen Research Group, UC San Diego Jacobs School of Engineering)*

### [A new computer program can recognize rough sketches—of bunnies, teapots, donuts, and more—as they’re drawn in real time](#)

[Futurity.org, 12SEP2012](#)

It’s the first computer application that enables “semantic understanding” of abstract sketches, researchers at Brown University say. The advance could clear the way for vastly improved sketch-based interface and search applications. [TECHNICAL ARTICLE](#)

*Tags: Information Technology, Featured Article*

## S&T NEWS ARTICLES

### ADVANCED MANUFACTURING

#### [Meet the Other Robots Set to Invade Manufacturing \(w/video\)](#)

[MIT Technology Review, 18SEP2012](#)

Unlike a conventional factory machine this new robot, Baxter, is safe to work alongside, highly adaptive, and amazingly easy to program. Just show it how to do a task and it’ll get on with it. Baxter really has the potential to shake up manufacturing by bringing automation to completely new areas of work.

*Tags: Advanced manufacturing, Autonomous Systems & Robotics*

#### [Printed intelligence industrialization unit expanding in Finland](#)

[Nanowerk, 18SEP2012](#)

The idea of printed intelligence is to manufacture functional electronics in such great quantities, at such great speed and at such low cost that they can be added to mass-produced products. The point of roll-to-roll assembly is to combine functionalities created with printing technology—flexible and with unique form factor—with robust and industrially mature silicon-based components and other electronic components into a functional end product.

*Tags: Advanced manufacturing*

*continued...*

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### [3D printers bring hi-tech manufacturing to the home](#)

Reuters, 17SEP2012

3D printers aren't new. They've been used to make manufacturing and engineering prototypes for more than 25 years. But printer makers are now turning their attention to the consumer market. Some printers capable of churning out simple items such as keychains, wine bottle holders and missing board game pieces are already selling for as little as \$350.

Tags: *Advanced manufacturing*

## ADVANCED MATERIALS

### [NRL demonstrates high durability of nanotube transistors in the harsh space environment](#)

EurekAlert, 18SEP2012

The hardened dielectric material and naturally isolated one-dimensional SWCNT structure developed with a thin gate oxide made from thin silicon oxynitride makes it extremely radiation tolerant. It does not suffer from radiation-induced performance changes.

Tags: *Advanced materials, CNT*

### [Watching electrons move at high speed](#)

MIT News, 18SEP2012

For the first time, the MIT team has managed to create three-dimensional "movies" of electron behavior in a topological insulator, or TI. The movies can capture vanishingly small increments of time—down to the level of a few femtoseconds, or millionths of a billionth of a second—so that they can catch the motions of electrons as they scatter in response to a very short pulse of light. [VIDEO](#)

Tags: *Advanced materials*

## AUTONOMOUS SYSTEMS & ROBOTICS

### [Video Friday: Telepresence Tallness, Twisty Tentacles, and Robot on Robot Violence](#)

IEEE Spectrum, 14SEP2012

Welcome to robot season!

Tags: *Autonomous systems & robotics*

## CYBER SECURITY

### [Carnegie Mellon voice verification technology prevents impersonators from obtaining voiceprints](#)

EurekAlert, 17SEP2012

Researchers at Carnegie Mellon University's Language Technologies Institute (LTI) say that a system they developed converts a user's voiceprint into something akin to passwords. Because a person's voice never sends the same signal twice, even when repeating the same word or phrase, converting the voiceprint into a single password won't do. Instead, the CMU system uses different

mathematical functions to generate hundreds of alphanumeric strings. To authenticate the user, the system compares all of the strings with those that the system has on file from the initial registration; if enough of the strings match, the user is authenticated.

Tags: *Cyber security*

### [Japan to establish cyber defense force in 2013](#)

ZDnet, 13SEP2012

About 100 people will be recruited for its cyberspace defense force, and the team will take over some of the security operations conducted by the ground, maritime and air self-defense forces.

Tags: *Cyber security*

### [Malware inserted on PC production lines, says study](#)

BBC News, 13SEP2012

In a report detailing its work to disrupt the Nitel botnet, Microsoft said the criminals behind the malicious program had exploited insecure supply chains to get viruses installed as PCs were being built. The viruses were discovered when Microsoft digital crime investigators bought 20 PCs, 10 desktops and 10 laptops from different cities in China.

Tags: *Cyber security*

## ENERGY

### [A computerized house that generates as much energy as it uses](#)

KurzweilAI, 19SEP2012

NIST has unveiled a laboratory in the form of a typical suburban home, designed to demonstrate that a family of four can generate as much energy as it uses in a year. It incorporates energy-efficient construction and appliances, as well as energy-generating technologies such as solar water heating and solar photovoltaic systems. [VIDEO](#)

Tags: *Energy, Government S&T*

### [First Tidal Power in U.S. Starts Flowing to the Grid](#)

IEEE Spectrum, 18SEP2012

Maine installation is the first offshore energy facility in the United States to supply power to a utility grid. [VIDEO](#)

Tags: *Energy*

## FORECASTING

### [Scientists Fight Radio Interference to Forecast Drought](#)

IEEE Spectrum, 18SEP2012

Soil Moisture and Ocean Salinity (SMOS) satellite is a crucial gauge for drought monitoring and prediction. The SMOS radiometer looks at areas approximately 50 by 50 kilometers, detecting minute microwave emissions from land and water to construct global maps of soil moisture and ocean salinity. The radiometer picked up bright,

*continued...*

“The scientist is motivated primarily by curiosity and a desire for truth.”

IRVING LANGMUIR

high-power, man-made signals that weren't supposed to be there which can drown the data they are trying to measure.

*Tags: Forecasting*

### **Better weather predictor on hand**

EU R&D News, 17SEP2012

The Met Office, UK, has developed and launched a new model that can provide better forecasts months in advance. Using a computer model, GloSea4 can simulate winds, humidity and temperatures on around a 150 km-spaced grid of points at a range of vertical heights from the surface, surpassing the stratosphere. This is why SSWs (sudden stratospheric warmings) are represented more realistically.

*Tags: Forecasting, S&T EU*

## GOVERNMENT S&T

### **World's most powerful digital camera opens eye, records first images in hunt for dark energy**

Science Daily, 18SEP2012

The Dark Energy Camera was constructed at the U.S. Department of Energy's (DOE) Fermi National Accelerator Laboratory. It is the most powerful survey instrument of its kind, able to see light from over 100,000 galaxies up to 8 billion light years away in each snapshot. The camera's array of 62 charged-coupled devices has an unprecedented sensitivity to very red light.

*Tags: Government S&T, Astronomy*

## IMAGING TECHNOLOGY

### **Radar measurements of highest precision**

Science Daily, 17SEP2012

Scientists have reached a record precision in radar distance measurements. With the help of a new radar system, an accuracy of one micrometer was achieved in joint measurements. The system is characterized by high precision and low cost. Potential applications lie in production and plant technology.

*Tags: Imaging technology, Advanced manufacturing*

### **Intel's 'Moore's Law Radio' could transform the wireless world**

Digital Trends, 16SEP2012

For the last 10 years, Intel has been trying to make all of those analog radio functions happen digitally. And this week, the company showed off the culmination of its work: a completely digital Wi-Fi unit that fits onto a single chip. Besides being smaller than any previous Wi-Fi system, it's also vastly more energy efficient, and ultimately will be much cheaper to build.

*Tags: Imaging technology*

### **Seeing through clothing: Radiation-enabled chips could lead to low-cost security imaging systems**

Science Daily, 14SEP2012

Scientists in Israel are reconfiguring existing semiconductor computer chips and turning them into high-frequency circuits with the capability of seeing through packaging and clothing to produce an image of what is hidden underneath. The chip could be the basis of sophisticated but affordable, portable detection technology able to meet everyday security needs.

*Tags: Imaging technology*

### **Impossible Instant Lab converts iPhone photos into polaroid prints**

Digital Trends, 12SEP2012

The Impossible Instant Lab works by using an extendable telescope top that cradles your iPhone with the screen side down. Using The Impossible Project app, you select your desired photo and place it in the slot, then wait for the Instant Lab to expose the photo from your iPhone screen onto an instant film. After that, push the print button and it's just a matter of seconds for the film to develop.

*Tags: Imaging technology, Information technology*

## INFORMATION TECHNOLOGY

### **Researchers demonstrate electronics that flex and stretch like skin**

Nanowerk, 18SEP2012

Researchers in Belgium have integrated an ultra-thin, flexible chip with bendable and stretchable interconnects into a package that adapts dynamically to curving and bending surfaces. The resulting circuitry can be embedded in medical and lifestyle applications where user comfort and unobtrusiveness is key, such as wearable health monitors or smart clothing.

*Tags: Information Technology, Flexible electronics*

### **Hard coating extends the life of new ultrahigh-density storage device**

Science Daily, 13SEP2012

Probe storage devices read and write data by making nanoscale marks on a surface through physical contact. The technology may one day extend the data density limits of conventional magnetic and optical storage, but current probes have limited lifespans due to mechanical wear.

### **TECHNICAL ARTICLE**

*Tags: Information Technology*

*continued...*

## MATERIALS SCIENCE

**[New NIST screening method identifies 1,200 candidate refrigerants to combat global warming](#)**[EurekAlert](#), 19SEP2012

The new NIST method estimates GWP (Global Warming Potential) by combining calculations of a compound's radiative efficiency and atmospheric lifetime, both derived from molecular structure. Additional filtering is based on low toxicity and flammability, adequate stability, and critical temperature in a desirable range. The method was applied to 56,203 compounds and identified 1,234 candidates for further study.

*Tags: Materials science, Government S&T*

**[Damaged metal surfaces repair themselves](#)**[Nanowerk](#), 17SEP2012

Researchers in Norway are now testing whether it is possible—where two metal surfaces are in contact with each other—to apply a coating to the surfaces formed of hard particles and capsules filled with liquid lubricant. When a coating without capsules was applied to the slide bearing, the friction coefficient was 0.7, while friction was reduced to 0.15 in bearings coated with a layer of capsules.

*Tags: Materials science*

## FEATURED RESOURCE

**[R&D Magazine](#)**

News stories and technical articles report on state-of-the-art scientific and technical advances, how the latest R&D instruments and techniques help researchers work more productively, and important trends in research management, funding, and policy.

[RSS](#)

**[Researchers solve the mystery of nanowire breakage](#)**[PhysOrg.com](#), 16SEP2012

The behavior of imperfections, and the resulting breakage, differ markedly between small structures, such as nanowires. However, scientists lacked complete understanding of the precise mechanics of nanowire breakages, owing in part to inconsistent behavior in experiments. These inconsistencies are now resolved thanks to numerical simulations by US and Singapore scientists.

*Tags: Materials science, Advanced materials*

**[Researchers look to alien soils for heat shield](#)**[Science Daily](#), 13SEP2012

At stake is the possibility that future spacecraft could leave Earth without carrying a heavy heat shield and instead make one on the surface of another world and ride it home safely. The weight savings opens new possibilities ranging

from using smaller rockets to carrying many more supplies on an exploration mission.

*Tags: Materials science*

**[Scientists use sound waves to levitate liquids, improve pharmaceuticals](#)**[Science Daily](#), 13SEP2012

At the molecular level, pharmaceutical structures fall into one of two categories: amorphous or crystalline. Amorphous drugs typically are more efficiently taken up by the body than their crystalline cousins. Levitation or “containerless processing” can form pristine samples that can be probed in situ with the high-energy X-ray beam at Argonne’s Advanced Photon Source. This allows amorphization of the drug to be studied while it is being processed.

*Tags: Materials science, Government S&T*

**[How to boil water without bubbles](#)**[Nature News](#), 12SEP2012

Those jittery beads of water are held up from the hot pan by a cushion of steam. The vapour cushion collapses as the surface falls below the ‘Leidenfrost temperature’, causing furious bubbling and spitting when the water droplet hits the surface and boils explosively. The effect could be used to reduce drag on surfaces such as the tiny channels in microfluidic devices. [TECHNICAL ARTICLE](#), [VIDEO](#)

*Tags: Materials science*

**[Point-like defects in a quantum fluid behave like magnetic monopoles](#)**[PhysOrg.com](#), 12SEP2012

No one has ever definitively observed a magnetic monopole, the hypothetical fundamental particle that has only a north or south magnetic pole, but not both like normal magnets. Now in a new study, scientists, in France, have observed a new type of monopole analogue in the form of tiny defects that arise in quantum states of matter called Bose-Einstein condensates (BECs). The discovery could help scientists better understand the fundamental nature of magnetism and may also lead to novel devices such as magnetronic circuits.

*Tags: Materials science*

## MICROELECTRONICS

**[‘Memristors’ based on transparent electronics offer technology of the future](#)**[Science Daily](#), 17SEP2012

Researchers at OSU (Oregon State University) have confirmed that zinc tin oxide, an inexpensive and environmentally benign compound, has significant potential for use in this field, and could provide a new, transparent technology where computer memory is based on resistance, instead of an electron charge. [TECHNICAL ARTICLE](#)

*Tags: Microelectronics*

*continued...*

## NEUROSCIENCE

**Brain Implant Improves Thinking in Monkeys****New York Times, 14SEP2012**

The device gives researchers a model for how to support and enhance fairly advanced mental skills in the frontal cortex of the brain, the seat of thinking and planning. The technology used in the study could easily be contained on an implantable chip and it is possible to envision a system that could help people with brain damage.

*Tags: Neuroscience*

## PHOTONICS

**World's most stable laser: Important for even better optical atomic clocks****Science Daily, 18SEP2012**

The laser in which the silicon resonator is stabilized reaches a linewidth of less than 40 mHz and can, thus, contribute to moving into a new dimension in the development of optical atomic clocks. This work could also benefit optical precision spectroscopy. **TECHNICAL ARTICLE**

*Tags: Photonics*

## S&amp;T POLICY

**Commission focuses on international science co-operation to meet global challenges****EU FET Research News, 17SEP2012**

EU's new strategy proposes to further focus on EU strategic priorities while maintaining the tradition of openness to third country participation in EU research. This includes addressing global challenges, but also making Europe more attractive as a location for research and innovation, and boosting industrial competitiveness.

*Tags: S&T policy, S&T EU***Innovation still lags after economic crisis****Nature News, 13SEP2012**

Innovation declined across all sectors worldwide in 2009, in response to the most serious economic turmoil for half a century. Average business spending on R&D in the OECD's 30 member countries dropped by a record 4.5% that year. It has picked up again in most places, but spending has not returned to pre-crisis levels everywhere.

*Tags: S&T policy, R&D Funding***Major £13.6 million boost for cutting-edge engineering research to raise UK's game****EurekaAlert, 12SEP2012**

Three ground-breaking engineering research projects, that promise to help solve major problems facing the UK, have been awarded grants totaling £13.6 million. The flagship

research embraces three distinct areas: Re-using carbon, the fundamental design of major infrastructure constructs, and the way we predict the complex behavior of fluid flows—which have implications in industries such as the transportation of oil and gas in pipelines.

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

## SCIENCE WITHOUT BORDERS

**The Potential of High-Value Innovation in U.S. Manufacturing****National Academies, 19SEP2012**

A new publication by the National Academy of Engineering titled Making Value: Integrating Manufacturing, Design, and Innovation to Thrive in the Changing Global Economy discusses many ways in which the U.S. is poised to benefit from opportunities in areas such as biomanufacturing, robotics, smart sensors, cloud-based computing, and nanotechnology.

*Tags: Science without borders***A Travelling Salesman Problem special case: 30-year-old problem solved****Science Daily, 14SEP2012**

The science of computational complexity aims to solve the TSP—the Travelling Salesman Problem—when the time required to find an optimal solution is vital for practical solutions to modern-day problems such as air traffic control and delivery of fresh food. Researchers in the UK have now solved a 30-year-old TSP special case problem. **TECHNICAL ARTICLE**

*Tags: Science without borders, Mathematics ■*

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