



# S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

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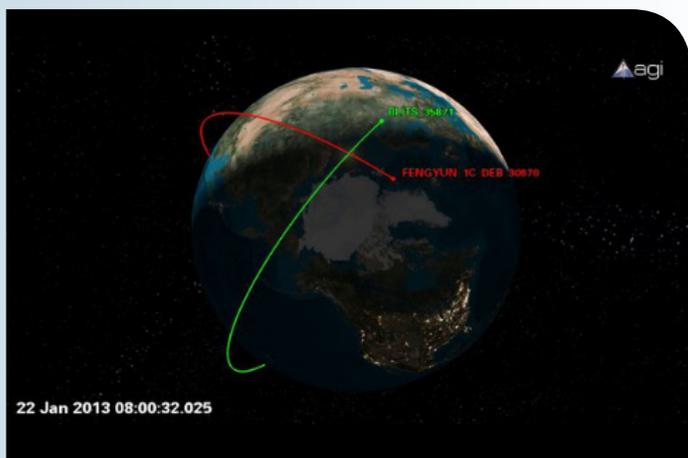
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## FEATURE ARTICLES

### [Chinese space debris collides with Russian satellite \(w/video\)](#)

[PhysOrg.com](#), 11MAR2013

The Center for Space Standards and Innovation (CSSI) has determined that on January 22, 2013 debris from the Chinese FENGYUN 1C collided with Russia's BLITS satellite. The FENGYUN 1C is the satellite that was destroyed by China on January 11, 2007 in a test of an anti-satellite missile. The collision changed the orbit of the Russian satellite, along with its spin velocity and attitude. [CHINESE SATELLITE DEBRIS ANALYSIS](#)



The image above is a screen capture from the AGI animation that depicts the event.

Tags: [Electronic Warfare](#), [S&T China](#), [Satellite technology](#), [Space technology](#), [Featured Article](#)

### [The Future of Quantum Information Processing \(Special issue of Science, March 8, 2013\)](#)

[Science NOW](#), 08MAR2013

The future of QIP appears bright in spite of the many remaining challenges. As a bonus, overcoming these challenges will probably also advance basic research.

Tags: [Quantum science](#), [Featured Article](#)

### [Epigenetics: Neurons remember because they move genes in space](#)

[Science Daily](#), 07MAR2013

Researchers in Poland have shown that during neuron stimulation permanent changes are observed with respect to genes' arrangement within the cell nucleus. Since modification of the geometrical structure of the nucleus leads to changes in gene expression, this is how the neuron remembers what happened. [TECHNICAL ARTICLE](#)

Tags: [Neuroscience](#), [Featured Article](#)

## S&T NEWS ARTICLES

### ADVANCED MATERIALS

#### [Super nanowire composite solves 'valley of death' riddle](#)

[Nanowerk](#), 12MAR2013

A team of researchers from the US, Australia and China have created composite materials that are twice as strong as high strength steels, that have elastic strain limits up to six per cent—which is 5–10 times greater than the elastic strains of the best spring steels currently available—and a Young's modulus of ~30 GPa, which is unmatched by any engineering materials so far. The breakthrough opens the door for a range of new and innovative applications.

[TECHNICAL ARTICLE](#)

Tags: [Advanced materials](#), [Materials science](#)

#### [Metamaterial is engineered for "Active Slow Light THz devices"](#)

[THz Science and Technology Network](#), 10MAR2013

An international team of researchers led by Los Alamos National Laboratory has developed artificially engineered resonant metamaterials that, when illuminated by a femto-second near-infrared laser light of varying intensity, can actively tune the group velocity of the terahertz light transmitted through the metamaterials. [TECHNICAL ARTICLE](#)

Tags: [Advanced materials](#), [Government S&T](#), [Terahertz technology](#)

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### **Self-assembled foam-like graphene networks formed through nucleate boiling**

Nature Scientific Reports, 10MAR2013

Researchers in Korea have developed self-assembled foam-like graphene (SFG) structures using a simple nucleate boiling method, which is governed by the dynamics of bubble generation and departure in the graphene colloid solution. The SFG structures can be directly formed on any substrate, including transparent conductive oxide (TCO) glasses, metals, bare glasses, and flexible polymers. As a potential application, SFG formed on fluorine-doped tin oxide (FTO) exhibited a slightly better overall efficiency (3.6%) than a conventional gold electrode (3.4%) as a cathode of quantum dot sensitized solar cells (QDSSCs).

Tags: *Advanced materials, Advanced materials*

### **Long predicted atomic collapse state observed in graphene**

Science Daily, 09MAR2013

By constructing artificial superlarge nuclei on graphene, researchers at Berkley Lab and UC Berkley have achieved the first experimental observation of long-sought atomic collapse, a phenomenon predicted by theorists seventy years ago. The observation will have important implications for the future of graphene-based electronic devices.

TECHNICAL ARTICLE

Tags: *Advanced materials*

## AUTONOMOUS SYSTEMS & ROBOTICS

### **Video Friday: Smart Snakebots, Harlem Shake RoboCup, and Drones Come Home**

IEEE Spectrum, 08MAR2013

Nao is a lucky robot. Its owners are always eager to teach it new things. How to tell stories. How to dance. How to be a comedian. How to groom cats. Now the robot is learning, thanks to some patient instruction, how to play golf.

Tags: *Autonomous systems & robotics*

## BIOTECHNOLOGY

### **Biological wires carry electricity thanks to special amino acids**

Science Daily, 12MAR2013

In nature, the bacterium *Geobacter sulfurreducens* uses nanowires, called pili, to transport electrons to remote iron particles or other microbes, but the benefits of these wires can also be harnessed by humans for use in fuel cells or bioelectronics, according to a study by researchers at the University of Massachusetts, Amherst. TECHNICAL

ARTICLE

Tags: *Biotechnology*

### **Specialised Germanium Surface as Universal Protein Adapter**

Science Daily, 08MAR2013

Researchers in Germany have developed a new method for attaching proteins to the surface of germanium crystals. This enables time-resolved tracking of the interactions between molecules using infrared spectroscopy in a way that is accurate down to atomic resolution. The method is applied in the EU project "Kinetics for Drug Discovery, K4DD." TECHNICAL ARTICLE

Tags: *Biotechnology, Biology*

### **Video Offers Glimpse of Biosafety Level 4 Lab**

Boston University, 07MAR2013

This Week in Virology netcast host Vincent Racaniello joins Ronald Corley, an associate director of BU's National Emerging Infectious Diseases Laboratories (NEIDL), for a rare tour of the Biosafety Level 4 facility in Boston.

Tags: *Biotechnology, Biology*

## BREAKTHROUGH TECHNOLOGY

### **Breaking the final barrier: Room-temperature electrically powered nanolasers**

Science Daily, 12MAR2013

Researchers at Arizona State University have produced a nanolaser that operates at room temperature without need of a refrigeration system, is powered by a simple battery instead of by another laser, and is able to emit light continuously. TECHNICAL ARTICLE 1, 2

Tags: *Breakthrough technology*

### **Physicists Discover a Whopping 13 New Solutions to Three-Body Problem**

Science NOW, 10MAR2013

In the 300 years since this "three-body problem" was first recognized, just three families of solutions have been found. Now, two physicists in Serbia have discovered 13 new families. It's quite a feat in mathematical physics, and it could conceivably help astrophysicists understand new planetary systems. TECHNICAL ARTICLE

Tags: *Breakthrough technology, Mathematics*

## COMMUNICATIONS TECHNOLOGY

### **Ultra-high-speed optical communications link sets new power efficiency record**

EureAlert, 12MAR2013

Ultrafast supercomputers that operate at speeds 100 times faster than current systems are now one step closer to reality. A team of IBM researchers working on a DARPA-funded program have found a way to transmit massive amounts of data with unprecedentedly low power consumption.

Tags: *Communications Technology*

“Research is the process of going up alleys to see if they are blind.”

MARSTON BATES

### **Millimeter Waves Will Expand The Wireless Future**

THz Science and Technology Network, 10MAR2013

Technology finally makes millimeter waves practical to use, enabling the continued growth of wireless communications before we run out of spectrum.

*Tags: Communications Technology, Terahertz technology*

### **New flex-grid system prevents optical network 'traffic jams'**

Science Daily, 08MAR2013

A team of researchers from Spain and Japan have achieved traffic control for the connections in optical networks by using a new dynamic network management system. If necessary, the flexible-grid system can redirect the traffic by re-arranging one or more existing connections.

*Tags: Communications Technology, S&T Japan*

## MATERIALS SCIENCE

### **New technique creates stronger, lightweight magnesium alloys**

Science Daily, 13MAR2013

Researchers at North Carolina State University have developed a new technique for creating stronger, lightweight magnesium alloys that have potential structural applications in the automobile and aerospace industries. [TECHNICAL ARTICLE](#)

*Tags: Materials science*

### **Surprising control over photoelectrons from a topological insulator**

Science Daily, 13MAR2013

The potential to control electron distribution in spintronic devices makes TIs a hot topic in materials science. Now scientists have discovered another useful surprise. Researchers at Berkeley Lab and the University of California at Berkeley have discovered how a photon beam can flip the spin polarization of electrons emitted from an exciting new material. [TECHNICAL ARTICLE 1, 2](#)

*Tags: Materials science, Government S&T*

### **Graphene researchers create superheated water that can corrode diamonds**

Nanowerk, 11MAR2013

A team of researchers from the National University of Singapore have successfully altered the properties of water, making it corrosive enough to etch diamonds. This was achieved by attaching a layer of graphene on diamond and heating to high temperatures. Water molecules trapped between them become highly corrosive, as opposed to normal water. This discovery has wide ranging industrial

applications, from environmentally-friendly degradation of organic wastes to laser-assisted etching of semiconductor or dielectric films. [TECHNICAL ARTICLE](#)

*Tags: Materials science*

### **Researchers solve riddle of what has been holding two unlikely materials together**

Science Daily, 11MAR2013

Researchers from North Carolina State University and RTI International found that when tellurium molecules were introduced to the vapor deposition chamber, tellurium reacted with the GaAs substrate to create a new surface layer of gallium telluride, which was only one molecule thick. The Bi<sub>2</sub>Te<sub>3</sub> then formed a thin film on top of that new surface layer. [TECHNICAL ARTICLE](#)

*Tags: Materials science*

### **Star-shaped waves spotted in shaken fluid**

Physics World, 10MAR2013

By shaking small cylindrical dishes of silicone oil, researchers in France have observed standing waves that spontaneously form a range of patterns, including stars and polygons. Calculations suggest that the shapes are caused by nonlinear interactions between “gravity waves”. The researchers hope that their work could lead to a better understanding of other nonlinear gravity waves such as tsunamis and rogue ocean waves. [TECHNICAL ARTICLE](#)

*Tags: Materials science*

### **Observing Matter-Antimatter Oscillations**

American Physical Society Spotlight, 07MAR2013

A less-familiar quantum effect, the oscillations of neutral mesons has intrigued legions of physicists for nearly sixty years. These mesons oscillate back and forth between particle and antiparticle states. The LHCb Collaboration has now reported the first significant single-measurement observation of oscillations in the neutral D-meson system. [TECHNICAL ARTICLE](#)

*Tags: Materials science, Particle physics*

## MICROELECTRONICS

### **Creating indestructible self-healing circuits**

Nanowerk, 11MAR2013

Researchers at Caltech have demonstrated self-healing capability in tiny power amplifiers. In perhaps the most dramatic of their experiments, the team destroyed various parts of their chips by zapping them multiple times with a high-power laser, and then observed as the chips automatically developed a work-around in less than a second. [TECHNICAL ARTICLE](#)

*Tags: Microelectronics*

*continued...*

## NEUROSCIENCE

**[A Wireless Brain-Computer Interface](#)****[MIT Technology Review, 11MAR2013](#)**

A team of researchers at Brown University reported that their fully implantable brain sensor can record the activity of dozens of neurons in freely moving subjects. They showed that the device continued to work after more than a year in pigs and macaques. Broadband communication and custom signal-processing chips power a new brain-recording device that may one day help paralyzed people.

**[TECHNICAL ARTICLE](#)***Tags: Neuroscience, Sensors*

## FEATURED RESOURCE

**[RIKEN Research \(Japan\)](#)**

Japan's largest research organization RIKEN's 3000+ researchers publish several hundred research articles across a broad spectrum of disciplines in science and technology.

**[The Hidden Costs of Cognitive Enhancement](#)****[Wired, 10MAR2013](#)**

Researchers at the University of Oxford who have been investigating brain stimulation to boost mathematical abilities report that those who had the parietal area involved in numerical cognition stimulated learned the new number system more quickly than those who got sham stimulation. But at the end of the weeklong study their reaction times were slower when they had to put their newfound knowledge to use to solve a new task that they hadn't seen during the training sessions.

**[TECHNICAL ARTICLE](#)***Tags: Neuroscience***[Human brain treats prosthetic devices as part of the body](#)****[Science Daily, 09MAR2013](#)**

Researchers in Italy have shown that people with spinal cord injuries show a strong association of wheelchairs as part of their body, not an extension of immobile limbs. The human brain can learn to treat relevant prosthetics as a substitute for a non-working body part, according to new research.

**[TECHNICAL ARTICLE](#)***Tags: Neuroscience, S&T Italy***[Researchers discover workings of brain's 'GPS system'](#)****[Science Daily, 09MAR2013](#)**

Researchers at Princeton University report that certain position-tracking neurons—called grid cells—ramp their activity up and down by working together in a collective

way to determine location, rather than each cell acting on its own as was proposed by a competing theory.

**[TECHNICAL ARTICLE](#)***Tags: Neuroscience*

## PHOTONICS

**[High-performance, organic nanowire phototransistors opens the way for optoelectronic device miniaturization](#)****[Science Daily, 12MAR2013](#)**

A team of researchers from the US and Korea have developed high-performance organic phototransistors (OPTs) based on single-crystalline n-channel organic nanowires. Compared with conventional photodiodes, phototransistors enable easier control of light-detection sensitivity without problems such as the noise increment.

**[TECHNICAL ARTICLE](#)***Tags: Photonics*

## QUANTUM SCIENCE

**[A no-go result on the purification of quantum states](#)****[Nature Scientific Reports, 10MAR2013](#)**

The information encoded in a quantum system is generally spoiled by the influences of its environment, leading to a transition from pure to mixed states. Reducing the mixedness of a state is a fundamental step in the quest for a feasible implementation of quantum technologies. Researchers in the UK show that it is impossible to “transfer” part of such mixedness to a “trash” system without losing some of the initial information.

*Tags: Quantum science, Communications Technology***[Chinese Physicists Measure Speed of “Spooky Action At a Distance”](#)****[MIT Technology Review, 10MAR2013](#)**

Einstein railed against the possibility of spooky action at a distance because it violates relativity. Now Chinese physicists have clocked it travelling more than four orders of magnitude faster than light.

**[TECHNICAL ARTICLE](#)***Tags: Quantum science, S&T China***[Quantum computing moves forward with spintronics progress](#)****[Nanowerk, 10MAR2013](#)**

Two significant breakthroughs are enabling this forward progress. The first is the ability to control qubits at room temperature. The second big development is the ability to control qubits for several seconds before they lapse into classical behavior.

**[TECHNICAL ARTICLE](#)***Tags: Quantum science*

### Researchers discover a way to avoid decoherence in a quantum system

PhysOrg.com, 10MAR2013

A team of physicists in Israel has used the scattering of a photon when it strikes an atom to better understand the process of decoherence. They found that the spin of an atom prior to being shot with a single photon determined whether decoherence took place or not. These findings could help develop better atomic clocks or lead to new ideas on ways to build a real true functional quantum computer. [TECHNICAL ARTICLE](#)

Tags: *Quantum science*

### The future of ion traps: Technology will continue to be leader in development of quantum computing architectures

Science Daily, 09MAR2013

Although quantum logic operations in chip traps remain elusive, the obstacles are not prohibitive. In the US, researchers at institutions such as NIST (Boulder), Sandia National Labs, Georgia Tech Research Institute, JQI, Duke, MIT, and others are now, often collaboratively, fabricating and testing these technologies. [TECHNICAL ARTICLE](#)

Tags: *Quantum science*

## SENSORS

### Electronic Sensors Printed Directly on the Skin

MIT Technology Review, 11MAR2013

Researchers at the University of Illinois at Urbana-Champaign have devised a way to “print” devices directly onto the skin so people can wear them for an extended period while performing normal daily activities. Now the research is focused on developing and refining wireless power sources and communication systems that could be integrated into the system. Such systems could be used to track health and monitor healing near the skin’s surface, as in the case of surgical wounds.

Tags: *Sensors, Flexible electronics*

### Japan quake ‘heard at edge of space’

BBC News, 10MAR2013

Scientists say the Magnitude 9.0 tremor on 11 March 2011 sent a ripple of sound through the atmosphere that was picked up by the Goce satellite. Its super-sensitive instrumentation was able to detect the disturbance as it passed through the thin wisps of air still present 255km above the Earth. [TECHNICAL ARTICLE](#)

Tags: *Sensors, Science without borders, Space technology* ■

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