



S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

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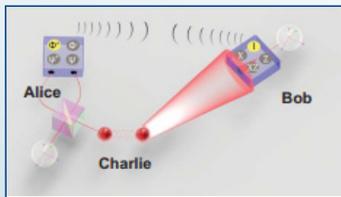
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FEATURE ARTICLES

[Chinese Physicists Smash Distance Record For Teleportation](#)

[MIT Technology Review, 15MAY2012](#)



The most important advance made by Chinese researchers is to develop a steering mechanism using a guide laser that keeps the beam precisely

on target. As a result, they were able to teleport more than 1100 photons in 4 hours over a distance of 97 kilometres. That's interesting because it's the same channel attenuation that you'd have to cope with when beaming photons to a satellite with, say, 20 centimetre optics orbiting at about 500 kilometres. The researchers clearly have their eye on the possibility of satellite-based quantum cryptography which would provide ultra secure communications around the world. [TECHNICAL ARTICLE](#)

Tags: Quantum science, Cryptology, Military technology, S&T China, Featured Article

[Power to the professors: A bold, new way to fund research begins at U-Michigan](#)

[PhysOrg.com, 15MAY2012](#)

A first-of-its-kind, real-time research funding initiative at the University of Michigan puts \$15 million into the hands of professors to jumpstart new projects they believe in. To qualify, three researchers from different disciplines just need to come up with an idea and agree to work together. A modern alternative to the traditional year-long government grant review process, the new MCubed program puts university professors in charge of divvying research dollars in a pure form of peer review.

Tags: STEM, R&D Funding, Featured Article

[Scientists generate electricity from viruses \(w/video\)](#)

[Nanowerk, 13MAY2012](#)

Scientists at the Lawrence Berkeley National Laboratory have developed a way to generate power using harmless viruses that convert mechanical energy into electricity. They tested their approach by creating a generator that produces enough current to operate a small liquid-crystal display. It works by tapping a finger on a postage stamp-sized electrode coated with specially engineered viruses. The viruses convert the force of the tap into an electric charge. Their generator is the first to produce electricity by harnessing the piezoelectric properties of a biological material. [VIDEO](#)

Tags: Breakthrough technology, DOE, Government S&T, Featured Article

S&T NEWS ARTICLES

ADVANCED MATERIALS

[African designer and scientist fashion anti-malaria garment that wards off bugs](#)

[Science Daily, 15MAY2012](#)

By binding repellent and fabric at the nanolevel using metal organic framework molecules -- which are clustered crystalline compounds -- the mesh fabric can be loaded with up to three times more insecticide than normal fibrous nets, which usually wear off after about six months.

Tags: Advanced materials

[MULTIFLEXIOXIDES - Transparent Electronics](#)

[R&D Magazine, 15MAY2012](#)

In the MULTIFLEXIOXIDES project scientists have developed new cost-efficient, long lasting, light, flexible and transparent devices which can display information directly on the windscreen. This is only possible by using small glass pads with a transparent substrate of nano-sized flexible oxides, which act as a basis for organic LED.

Tags: Advanced materials

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New 'metamaterial' practical for optical advances

Nanowerk, 15MAY2012

Researchers at Perdue University have developed a new metamaterial consisting of 16 layers alternating between AZO and zinc oxide. Light passing from the zinc oxide to the AZO layers encounters an "extreme anisotropy," causing its dispersion to become "hyperbolic," which dramatically changes the light's behavior. The doped oxide is compatible with semiconductors and has enhanced performance.

Tags: Advanced materials, Metamaterials

Researchers map path to quantum electronic devices

R&D Magazine, 15MAY2012

A team of Duke University engineers has created a master "ingredient list" describing the properties of more than 2,000 compounds that might be combined to create the next generation of quantum electronics devices. Discovering TIs (topological insulators) is of great interest to scientists, but because of the lack of a rational blueprint for creating them, researchers have had to rely on trial-and-error approaches, with limited success to date.

Tags: Advanced materials

Fingerprinting a new class of materials

RIKEN , 11MAY2012

A research team from Japan and the USA has predicted the existence of a unique and unexpected signature of topological superconductors: the speed of their rotation affects their ability to transport heat and vice versa. Although potentially a long way off, the unique properties of electrons at the surface of topological superconductors may find practical applications in electronics.

Tags: Advanced materials, S&T Japan

BIOTECHNOLOGY

Virus 'barcodes' offer rapid detection of mutated strains

PhysOrg.com, 15MAY2012

Researchers at the University of Leeds are developing a way to 'barcode' viral diseases to rapidly test new outbreaks for potentially lethal mutations. Their work was focused on common respiratory viruses, such as flu and HRSV, but this method could be applied to a wide variety of viruses, including tropical diseases that are prone to sudden outbreaks and can be lethal.

Tags: Biotechnology, Biology

COMMUNICATIONS TECHNOLOGY

Several antennas in one: A major innovation for mobile communications

PhysOrg.com, 15MAY2012

Researchers in France have developed an antenna capable of emitting simultaneously two information flows, transmitting two independent signals with the same throughput, just as two antennas would do in a MIMO system. This technique called "Beamspace MIMO" allows to significantly reduce the number of physical antennas.

Tags: Communications Technology

CYBER SECURITY

Cybersecurity experts investigate self-adapting computer network

R&D Magazine, 15MAY2012

The study by researchers at Kansas State University will be the first to document whether adaptive cybersecurity, a computer network that could protect itself against online attackers by automatically changing its setup and configuration called moving-target defense, can be effective.

Tags: Cyber security

ENERGY

A new accelerator to study steps on path to fusion

R&D Magazine, 15MAY2012

NDCX-II, the second generation Neutralized Drift Compression Experiment, at the Lawrence Berkeley National Laboratory will make advances in the acceleration, compression, and focusing of intense ion beams that can inform and guide the design of major components for heavy-ion fusion energy production. The eventual goal is to produce electrical power with particle accelerators through inertial confinement fusion.

Tags: Energy, DOE, Government S&T

New Cement-Making Method Could Slash Carbon Emissions

MIT Technology Review, 15MAY2012

Researchers at George Washington University have bolted together an ungainly contraption that they say efficiently uses the energy in sunlight to power a novel chemical process to make lime, the key ingredient in cement, without emitting carbon dioxide. The device puts to work about half of the energy in sunlight (solar panels convert just 15 percent of the energy in sunlight into electricity).

Tags: Energy, Environment

“Every great advance in science has issued from a new audacity of imagination.”

KAHNEMAN

New nanostructure for batteries keeps going and going

PhysOrg.com, 15MAY2012

Researchers at Stanford have designed a double-walled nanostructure that lasts more than 6,000 cycles, far more than needed by electric vehicles or mobile electronics. The new double-walled silicon nanotube anode is made by a clever four-step process: Polymer nanofibers are made, then heated (with, and then without, air) until they are reduced to carbon. Silicon is coated over the outside of the carbon fibers. Finally, heating in air drives off the carbon and creates the tube as well as the clamping oxide layer.

Tags: Energy, Advanced materials

Secrets of the first practical artificial leaf

Science Daily, 10MAY2012

Unlike earlier devices which used costly ingredients the new device is made from inexpensive materials and employs low-cost engineering and manufacturing processes. Researchers replaced the platinum catalyst that produces hydrogen gas with a less-expensive nickel-molybdenum-zinc compound. On the other side of the leaf, a cobalt film generates oxygen gas.

Tags: Energy, Solar energy

ENVIRONMENTAL SCIENCE

Could paint particles protect the planet?

Nature News, 15MAY2012

The technology concept developed in the UK and first revealed in this month's tce magazine *Up and away*, advocates dispersing benign titanium dioxide particles as used in paint, inks and sunscreens into the stratosphere to deflect the sun's rays. When in 1991 Mount Pinatubo erupted in the Philippines, it caused temperatures to drop by around 0.5oC around the globe for two years. The eruption threw 20 million tons of sulphur dioxide into the stratosphere, forming a fine mist of sulphuric acid particles that spread over the globe in a matter of months.

Tags: Environmental science

EU physicists use 20 new satellites to forecast space weather

PhysOrg.com, 15MAY2012

The northern lights interfere with radio communications, GPS navigation and satellite communications. Researchers are now going to launch 20 satellites containing world class instruments from the University of Oslo to find out why.

Tags: Environmental science, Space technology

Geoengineering experiment cancelled amid patent row

Nature News, 15MAY2012

The Stratospheric Particle Injection for Climate Engineering (SPICE) project is a collaboration among several UK universities and Cambridge-based Marshall Aerospace to investigate the possibility of spraying particles into the stratosphere to mitigate global warming. Such particles could mimic the cooling produced by large volcanic eruptions, by reflecting sunlight before it reaches the Earth's surface.

Tags: Environmental science

Hunting for bomb-eating bugs

PhysOrg.com, 15MAY2012

University of Arizona researchers are studying the environmental effects of insensitive munitions compounds, or IMCs, which are more stable explosives that won't detonate in response to heat or shock. Bacteria play a large part in breaking down compounds in the soil. They do this directly by metabolizing the compounds, or indirectly through co-metabolism, which occurs when the bacteria consume other food sources, such as plant material, and provide energy to convert IMCs to intermediate compounds.

Tags: Environmental science

FOREIGN S&T

Russia Develops Revolutionary Ammonia Rocket Engine

Space Daily, 08MAY2012

Power engineering manufacturer Energomash has started development of a new rocket engine which could vastly reduce the cost of rocket launches and avoid the need to produce hydrogen for fuel. The new rocket, which will be around 30 percent more efficient than existing designs, works on a completely novel fuel mixture of acetylene and ammonia.

Tags: Foreign S&T

GOVERNMENT S&T

New ONR program aims to develop solid-state laser weapons for ships

EurekaAlert, 10MAY2012

To help sailors defeat small boat threats and aerial targets without using bullets, the Office of Naval Research wants to develop a solid-state laser weapon prototype that will demonstrate multi-mission capabilities aboard a Navy ship. ONR will host an industry day May 16 to provide the research and development community with information

about the program. A Broad Agency Announcement is expected to be released thereafter to solicit proposals and bids.

Tags: Government S&T, Military technology, ONR

INFORMATION TECHNOLOGY

[The elusive capacity of networks](#)

e! Science News, 16MAY2012

In their first paper, MIT and CalTech researchers analyze the case in which the noise in a given link is unrelated to the signals traveling over other links, as is true of most wired networks. In that case, the researchers show, the problems of error correction and network coding can be separated without limiting the capacity of the network as a whole.

Tags: Information Technology

[Hard drives: A bit of progress](#)

Science Daily, 15MAY2012

Bit-patterned media technology developed by researchers in Singapore replaces the continuous magnetic film traditionally used in hard drives with an array of small, patterned magnetic dots each of which stores a bit of data. By carefully designing the size and shape of these dots, data can be stored at very high densities without the instability that would be encountered if a continuous film were used.

Tags: Information Technology

FEATURED RESOURCE

[Chinese Academy of Sciences](#)

Established in 1949 CAS has 12 branch offices, 117 institutes with legal entity, more than 100 national key laboratories and national engineering research centers, more than 1,000 field stations, and staff over 50,000. Most articles are in Chinese with English abstracts. [RSS](#)

MATERIALS SCIENCE

[Significant water anomaly explained](#)

Science Daily, 10MAY2012

Researchers in the US have shown that the volume of water in ice depends on the quantum “zero-point” motion of the H and O atoms in an opposite way from “normal” materials. Crystals shrink as they are cooled, but because of “zero-point” motion, shrinking stops before reaching temperatures of absolute zero.

Tags: Materials science

MEDICAL SCIENCES

[Twist on ancient math problem could improve medicine, microelectronics](#)

R&D Magazine, 11MAY2012

It turns out we’ve been missing a version of the famous “packing problem,” and its new guise could have implications for cancer treatment, secure wireless networks, microelectronics and demolitions, researchers in the US say.

TECHNICAL ARTICLE

Tags: Medical Sciences, Mathematics

[Canada researchers find clues to a universal flu vaccine](#)

Terra Daily, 08MAY2012

Researchers discovered that the vaccine given against “swine flu,” or the 2009 H1N1 variety, triggered a series of antibodies that protect against many other types of flu, including the highly lethal H5N1 bird flu strain. The reason why these broadly protective antibodies are effective is they bind to the stem of a flu protein called hemagglutinin (HA) instead of the head of the same protein like most flu vaccines do.

Tags: Medical Sciences, Biology

MICROELECTRONICS

[SMIC and Beijing Government Sign Cooperation Framework Document to Launch SMIC Beijing Second Phase Expansion Project](#)

Nanowerk, 16MAY2012

Semiconductor Manufacturing International Corporation, China’s largest and most advanced semiconductor foundry, today announced the signing of a cooperation framework document between its subsidiary SMIC Beijing and the Beijing municipal government, which will lead to the establishment of a joint venture to launch SMIC Beijing’s Second Phase Expansion Project.

Tags: Microelectronics, Advanced materials, S&T China, S&T Policy

[Moore’s Law Over, Supercomputing “In Triage,” Says Expert](#)

MIT Technology Review, 09MAY2012

High Performance Computing expert Thomas Sterling is showing that we’re not going to reach the next supercomputing milestone with more incremental improvements on existing systems, which is how we reached the last two milestones. Indeed, he says that without “innovative ways of managing vertical and lateral data movement,” current estimates posit that future exascale machines will use roughly ten times more power than is considered feasible.

Tags: Microelectronics

NEUROSCIENCE

[A Computer Interface that Takes a Load Off Your Mind](#)[MIT Technology Review, 15MAY2012](#)

A system, called Brainput, developed by MIT and Tufts University researchers is designed to recognize when a person's workload is excessive and then automatically modify a computer interface to make it easier. The researchers used a lightweight, portable brain monitoring technology, called functional near-infrared spectroscopy (fNIRS), that determines when a person is multitasking. Analysis of the brain scan data was then fed into a system that adjusted the user's workload at those times.

Tags: Neuroscience, Information technology

PHOTONICS

[Nanotubes and silicon: unexpected ingredients in a new optical device](#)[Nanowerk, 10MAY2012](#)

Different from conventional diodes, the photocurrent in a device developed by Northeastern University researchers can be controlled by applying a voltage. A few volts can change the photocurrent by up to four orders of magnitude. Since only small amounts of light are required, the phenomenon could be useful for low power optoelectronics. If the behavior can work in the infrared spectrum, it could mean more efficient night-vision technologies.

Tags: Photonics, Military technology

QUANTUM SCIENCE

[Physicists Store Short Movie In A Cloud of Gas](#)[MIT Technology Review, 09MAY2012](#)

Researchers have been able to store single images in a cloud of rubidium atoms for several years. Now they've gone a step further by storing two images at the same time. The images are the letter T and the letter N and the sequence of pictures shows the images being released from the gas, as recorded by a high speed camera in 100 nanosecond frames. One of the enabling technologies for a quantum internet is the ability to store and retrieve quantum information in a reliable and repeatable way.

TECHNICAL ARTICLE

Tags: Quantum science

[The Quantum Biology Conundrum](#)[MIT Technology Review, 08MAY2012](#)

The question is whether nature exploits quantum mechanics to achieve things that are not possible in the ordinary, classical world. On the one hand, evidence has begun to mount that quantum mechanics may play a role in processes such as photosynthesis, bird navigation and the sense of

smell. On the other, critics say this evidence is far from conclusive and may simply show that reality always appears quantum in nature, if you look closely enough. **TECHNICAL ARTICLE**

Tags: Quantum science

S&T POLICY

[China plans to have a 5 megawatt Liquid Fluoride Thorium Reactor in 2015](#)[Next Big Future, 10MAY2012](#)

In January 2011 the Chinese Academy of Sciences launched a program of R&D on thorium-breeding molten-salt reactors (Th-MSR or TMSR), otherwise known as Liquid Fluoride Thorium Reactor (LFTR), claiming to have the world's largest national effort on these and hoping to obtain full intellectual property rights on the technology.

Tags: S&T policy, S&T China

[DFG establishes 10 new priority programs](#)[EurekaAlert, 10MAY2012](#)

The German Research Foundation has established highly interdisciplinary programmes which will use a "troika strategy": each joint research problem will be tackled by experimenters, methods developers and analysis experts in the field of computational neuroscience. All Priority Programmes share a strong focus on early career support, which is a key requirement for their establishment.

Tags: S&T policy, S&T Germany

SENSORS

[Dip chip technology tests toxicity on the go](#)[Science Daily, 15MAY2012](#)

Researchers have developed a portable "dip chip" that detects water toxicity quickly and accurately. Once perfected, the chip might be plugged into ordinary smartphones or PDA devices to provide a toxicity alert. The Dip Chip contains microbes designed to exhibit a biological reaction to toxic chemicals, emulating the biological responses of humans or animals.

Tags: Sensors, Biotechnology

[A Nose in Your Clothes](#)[MIT Technology Review, 10MAY2012](#)

A U.K. company says its highly pressure-sensitive material could be used to integrate an "electronic nose" into paper or clothing. In the case of the new sensors, the QTC (quantum tunneling composites) is made of VOC (volatile organic compounds)-absorbing polymers that are spotted with Peratech's conductive metallic particles. When the polymer absorbs a VOC, it swells, thus pushing the conductive particles closer to one another, enabling quantum tunneling and thus electron flow.

Tags: Sensors

STEM

[AIP Endorses Letter Urging Congress to Consider STEM Education a National Priority](#)

[American Institute of Physics, 15MAY2012](#)

The letter strongly urges that STEM education be considered a national priority in the budgets for the Department of Education, the National Science Foundation, and other federal agencies “engaged in providing resources for educators, students and researchers.” The letter advocates for “comprehensive and strategic efforts to coordinate, evaluate, and review all federal STEM programs on a regular basis.”

Tags: *STEM* ■

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