



S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

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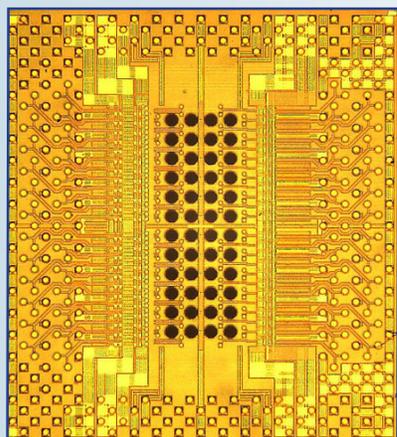
FEATURE ARTICLES

[New online energy harvesting data repository launched](#)

EurekaAlert, 09MAR2012

Energy data from sources such as human motion, wind speeds and light irradiance that could be used to power wireless electronic devices is being made available to the world's scientific community, thanks to a new resource being launched this month at the University of Southampton. The [Energy Harvesting Open Access Data Repository](#) is an online resource for researchers worldwide to share detailed data on energy availability and characteristics.

Tags: Energy, Featured Article



Photomicrograph of IBM Holey Optochip. Original chip dimensions are 5.2 mm x 5.8 mm.

chip. The holes allow optical access through the back of the chip to 24 receiver and 24 transmitter channels to produce an ultra-compact, high-performing and power-efficient optical module capable of record setting data transfer rates. Holey Optochip is the first parallel optical transceiver to transfer one trillion bits—one terabit—of information per second.

Tags: Microelectronics, Optical communication, Featured Article

[New prototype optical chip-set would allow downloading 500 high definition movies—per second!](#)

Nanowerk, 08MAR2012

Using a novel approach, scientists in IBM labs developed the Holey Optochip by fabricating 48 holes through a standard silicon CMOS

[Communication technologies including smartphones and laptops could now be 1,000 times faster](#)

EurekaAlert, 07MAR2012

The University of Pittsburgh team has generated a frequency comb—dividing a single color of light into a series of evenly spaced spectral lines for a variety of uses—that spans more than 100 terahertz bandwidth by exciting a coherent collective of atomic motions in a semiconductor silicon crystal. The ability to modulate light with such a bandwidth could increase the amount of information carried by more than 1,000 times when compared to the volume carried with today's technologies.

Tags: Communications Technology, Terahertz technology, Featured Article

S&T NEWS ARTICLES

ADVANCED MATERIALS

[Butterfly molecule may aid quest for nuclear clean-up technology](#)

EurekaAlert, 12MAR2012

The distinctive butterfly-shaped compound is similar to radioactive molecules that scientists had proposed to be key components of nuclear waste, but were thought too unstable to exist for long. Researchers have shown the compound to be robust, which implies that molecules with a similar structure may be present in radioactive waste. Improving treatment processes for nuclear waste, including targeting this type of molecule, could help the nuclear industry move towards cleaner power generation, in which all the radioactive materials from spent fuel can be recovered and made safe or used again.

Tags: Advanced materials, Nuclear energy

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Metamaterials may advance with new femto-second laser technique

EurekAlert, 08MAR2012

Harvard University researchers have cleared an important hurdle in the development of metamaterials that bend light in unusual ways. Working at a scale applicable to infrared light, the Harvard team has used extremely short and powerful laser pulses to create three-dimensional patterns of tiny silver dots within a material. Those suspended metal dots are essential for building futuristic devices like invisibility cloaks.

Tags: Advanced materials, Materials science

Polymer scientists and physicists, inspired by curly leaves, develop new technique for shaping thin gel sheets

Science Daily, 08MAR2012

Inspired by nature's ability to shape a petal, and building on simple techniques used in photolithography and printing, researchers have developed a new tool for manufacturing three-dimensional shapes easily and cheaply, to aid advances in biomedicine, robotics and tunable micro-optics.

Tags: Advanced materials, Biomimetics

RUB researchers present a new switching principle for magnetic fields

EurekAlert, 08MAR2012

An international team of researchers from Germany and the Netherlands has developed a new material for storage media. For the first time they enable the switching of so called spin currents at room temperature in a vertical magnetic field. This increases the storage density distinctly. The novel switches can be used, for example, as read heads in future hard discs or as bits in nonvolatile random access memory devices.

Tags: Advanced materials, Information technology

China Surges ahead of India in Nano-technology: Does it Matter?

IEEE Spectrum, 07MAR2012

In this latest study published in Scientometrics, once you get past the quantification of the race (i.e. how many articles are published, how many times they are cited, etc.), you discover the interesting bit. It seems China is focusing its efforts in nanotechnology research on "nanomaterials and their applications" whereas India is focusing their work on addressing their developmental problems, such as clean drinking water.

Tags: Advanced materials, Nanomaterials

AUTONOMOUS SYSTEMS & ROBOTICS

NRL designs robot for shipboard firefighting

KurzweilAI, 13MAR2012

The firefighting robot, called the Shipboard Autonomous Firefighting Robot (SAFFiR), is being designed to move

autonomously throughout the ship, interact with people, and fight fires, handling many of the dangerous firefighting tasks that are normally performed by humans.

Tags: Autonomous systems & robotics, NRL

Optimizing Routes for Underwater Vehicles: Sometimes the Quickest Path Is Not a Straight Line

Science Daily, 08MAR2012

Researchers at MIT have developed a mathematical procedure that can optimize path planning for automated underwater vehicles, even in regions with complex shorelines and strong shifting currents. The system can provide paths optimized either for the shortest travel time or for the minimum use of energy, or to maximize the collection of data that is considered most important.

Tags: Autonomous systems & robotics, Mathematics

Teach Your Robot Well

Science Daily, 08MAR2012

Researchers at Georgia Tech have identified the types of questions a robot can ask during a learning interaction that are most likely to characterize a smooth and productive human-robot relationship. These questions are about certain features of tasks, more so than labels of task components or real-time demonstrations of the task itself. Questions were identified not by studying robots, but by studying the everyday people who one day will be their masters.

Tags: Autonomous systems & robotics, Robotics

BREAKTHROUGH TECHNOLOGY

Barrier to faster graphene devices identified and suppressed

Nanowerk, 13MAR2012

A team of Vanderbilt physicists have nailed down the source of the interference inhibiting the rapid flow of electrons through graphene-based devices and found a way to suppress it. This discovery allowed them to achieve record-levels of room-temperature electron mobility three times greater than those reported in previous graphene-based devices.

Tags: Breakthrough technology, Advanced materials, Materials science, Nanomaterials

New Discovery Shines Light on the 3 Faces of Neutrinos

Science Newsline, 08MAR2012

A new discovery provides a crucial key to understanding how neutrino oscillation may help shed light on why matter exists in the universe. The measurement makes possible new experiments that may help explain why the present universe is filled mostly with matter, and not equal parts of matter and antimatter that would have annihilated each other to leave behind nothing but energy.

Tags: Breakthrough technology

“Technology is so much fun but we can drown in our technology.

The fog of information can drive out knowledge.” DANIEL J. BOORSTIN

Antimatter Zapped! Historic Experiment Brings Scientists 1 Step Closer to Understanding the Universe

Science Newsline, 07MAR2012

First it was caught. Then it was stored. And now it is being made to jump. “It” is the elusive antihydrogen atom. Researchers at CERN, in an international effort led by a Canadian team, have used microwaves to manipulate anti-hydrogen atoms. In doing so, they’ve provided the world with its first glimpse of an “anti-atomic fingerprint.

Tags: Breakthrough technology, Science without borders

Researchers Capture First-Ever Image of Atoms Forming a Molecule

Newswise, 07MAR2012

Researchers in the U.S. have recorded the first-ever image of two atoms bonding together to form a molecule. The team used ultrafast laser pulses to knock one electron out of its natural orbit in one of the atoms, just as the two atoms were bonding together. The technique offers a new tool to study the structure and dynamics of matter.

Tags: Breakthrough technology, Medical Sciences

ELECTRONIC WARFARE

China, U.S. Chase Air-to-Air Cyberweapon

Aviation Week, 09MAR2012

The Air Force is pursuing “cyber-methods to defeat aircraft,” reports Gen. Norton Schwartz, the service’s chief of staff. Electronic warfare specialists know the technology is already a double-edged sword, however. The Chinese, a senior service official says, are already working hard on, and in some cases fielding, similar systems to attack high-value aircraft used for early warning, electronic surveillance, command and control, and intelligence.

Tags: Electronic Warfare

ENERGY

Chinese researchers outline 5 key areas of future research to realize rechargeable Li-air batteries

Next Big Future, 13MAR2012

The energy density of the lithium–air battery with respect to the anode could reach 13,000 Wh kg⁻¹—quite close to the 13,200 Wh kg⁻¹ of gasoline. Although researchers have made significant progress, the Li–air battery is still at an embryonic stage, with numerous scientific and technical challenges that must be overcome if the promise is to be realized. TECHNICAL ARTICLE: Lei-Lei Zhang, et al. The development and challenges of rechargeable

non-aqueous lithium–air batteries, International Journal of Smart and Nano Materials, DOI:10.1080/19475411.2012.659227

Tags: Energy, Battery, S&T China

Cheap Solar Power at Night

MIT Technology Review, 12MAR2012

Materials, which include new mixtures of salts as well as new glass materials, could be key to making solar-thermal power plants cheap enough—and reliable enough—to compete with fossil fuels on a large scale. Unlike solar panels—which convert sunlight directly into electricity—solar-thermal plants generate electricity by using a large field of mirrors to concentrate sunlight and produce high temperatures that, in turn, generate steam for a turbine and drive a generator.

Tags: Energy, Solar energy

FORECASTING

Trouble at the text mine

Nature News, 07MAR2012

Computers can rapidly scan through thousands of research papers to make useful connections, but work is being slowed by publishers’ unease. Freely available patents and article abstracts are open for text-mining, but material behind paywalls is not—even when institutions have paid for a site licence. The licence is oriented towards permitting the human to download and read an article, but not to text-mine it.

Tags: Forecasting, Bibliometrics

GOVERNMENT S&T

NASA launches global hackathon challenge

KurzweilAI, 14MAR2012

NASA is inviting all citizens of planet Earth to take part in a two-day coding marathon in April. Called the International Space Apps Challenge, the idea is to develop software for various purposes to support NASA’s mission. The challenge will take place in several cities on all continents around the globe. NASA Challenges

Tags: Government S&T, NASA

DIA takes the lead on developing a common desktop environment

Defense Systems, 13MAR2012

Grant Schneider, DIA’s deputy director for information management and CIO, discusses the path toward common links between the intelligence agencies.

Tags: Government S&T, Information technology

IMAGING TECHNOLOGY

Taking precise photos of proteins - is filming them just round the corner?

EurekAlert, 08MAR2012

An international team of researchers from Germany, Sweden and the United States has found a more effective way of imaging proteins, something that could soon lead to filming how they work at the molecular level. The better scientists can map out the structure of proteins and how they behave in cells, the closer they can get to unlocking the cure to major diseases such as cancer and malaria.

Tags: Imaging technology, Biology, Biotechnology

Although the value was first predicted more than 50 years ago, it is so small that measuring it has proved impossible—until now. The experiment, which involved trapping a tiny bead in a double well created by a laser and tracking its motion as it flipped between wells, places a lower limit on the energy dissipated by logic circuits, which could affect the design of future electronic devices.

Tags: Information Technology, Science without borders

Resetting the future of MRAM and Spintronics Next Big Future, 09MAR2012

Helmholtz-Zentrum Berlin (HZB) have developed a novel, extremely-thin structure made of various magnetic materials. In addition to the (re-)charging process, magnetic characteristics of the electrons can also be used for information-processing and -storage. The advantage of the new structure: data remain intact even after the electric current has been switched off and the memory can be re-written more or less indefinitely.

Tags: Information Technology, Advanced materials

MATERIALS SCIENCE

Molecular Speed Bump

American Institute of Physics, 08MAR2012

Using lasers to significantly slow molecules, researchers at Yale University slowed as much as 6% of the molecules in their original beam from 140 meters per second to less than 50, which required each molecule to absorb and re-emit some 10,000 photons. This should allow new types of molecules to be trapped, an important prerequisite to studying chemical reactions and quantum phenomena at ultralow temperatures.

Tags: Materials science, Quantum science

MICROELECTRONICS

Strong Grip: Unexpected Interaction Between Organic Semiconductors

Science Daily, 09MAR2012

Scientists have assumed that organic materials only interact among themselves via weak van der Waals forces. Only in contact with certain metals do they display stronger bonding known as chemisorption. For the first time, researchers in Germany have been able to demonstrate such chemisorption between two organic layers, which were applied to a silver crystal by chemical vapour deposition.

Tags: Microelectronics, Semiconductors

Taking a closer look at molecular electronics Nanowerk, 09MAR2012

The key characteristic of the Japanese team's fluorescence yield x-ray absorption spectroscopy is its ability to probe molecules that are buried underneath other molecules, as well as under metallic electrodes. First, x-ray photons illuminate a device of interest, causing core electrons inside a particular atom to be promoted to higher energy levels.

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FEATURED RESOURCE

Nature Publishing Index

The Nature Publishing Index ranks institutions according to the number of primary research articles they publish in Nature journals. Nature journals provide relatively limited coverage of applied sciences, engineering and clinical medicine. The Index should therefore be viewed as primarily an index of high quality basic and not applied research.

INFORMATION TECHNOLOGY

The Hidden Risk of a Meltdown in the Cloud

MIT Technology Review, 13MAR2012

Yale University researchers point out that complex systems can fail in many unexpected ways. They outline various simple scenarios in which a cloud could come unstuck. In the worst case scenario, a cloud could experience a full meltdown that could seriously threaten any business that relies on it.

Tags: Information Technology

On-demand satellite imagery envisioned for frontline warfighters

DARPA, 12MAR2012

DARPA's SeeMe program (Space Enabled Effects for Military Engagements) aims to give mobile individual US warfighters access to on-demand, space-based tactical information in remote and beyond-line-of-sight conditions. If successful, SeeMe will provide small squads and individual teams the ability to receive timely imagery of their specific overseas location directly from a small satellite with the press of a button—something that's currently not possible from military or commercial satellites.

Tags: Information Technology, DARPA, Military technology

Wiping data will cost you energy

Physics World, 12MAR2012

For the first time physicists have measured the tiny amount of heat released when an individual bit of data is erased.

When these electrons relax, they release their energy either to other electrons, or to photons. Finally, these energetic electrons or photons are emitted from the device, and the researchers can measure their energy.

Tags: Microelectronics

Biodegradable transistors—made from us **EurekAlert, 07MAR2012**

A Tel Aviv University team has brought together cutting-edge techniques from multiple fields of science to create protein-based transistors from organic materials found in the human body. They could become the basis of a new generation of nano-sized technologies that are both flexible and biodegradable. Working with blood, milk, and mucus proteins which have the ability to self-assemble into a semi-conducting film, the researchers have already succeeded in taking the first step towards biodegradable display screens, and they aim to use this method to develop entire electronic devices.

Tags: Microelectronics, Advanced materials

NEUROSCIENCE

Scientists tap the genius of babies and youngsters to make computers smarter **Berkeley News, 12MAR2012**

In a wide range of experiments involving lollipops, flashing and spinning toys, and music makers, among other props, UC Berkeley researchers are finding that children – at younger and younger ages – are testing hypotheses, detecting statistical patterns and drawing conclusions while constantly adapting to changes. Young children are capable of solving problems that still pose a challenge for computers, such as learning languages and figuring out causal relationships. [VIDEO](#)

Tags: Neuroscience, Artificial intelligence

PHOTONICS

Optics Express Focus Issue: Modular Ultrafast Lasers

Science Newslines, 14MAR2012

Ultrafast lasers have enabled a wide-range of fundamental science and applications over the past two decades. To highlight recent state-of-the-art developments in femto-second lasers, the Optical Society (OSA) today published a series of papers as part of an upcoming special [Focus Issue on Modular Ultrafast Lasers](#) in its open-access journal *Optics Express*.

Tags: Photonics

S&T POLICY

Business R&D Performed in the United States Cost \$291 Billion in 2008 and \$282 Billion in 2009

NSF, 13MAR2012

Companies spent \$282 billion on research and development performed in the United States during 2009 and \$291 billion during 2008. Funding from the companies' own sources declined during this period (\$233 billion to \$225 billion); funding from other sources remained about the same during the 2 years, \$58 billion to \$57 billion.

Tags: S&T policy, R&D Funding

China's budget backs science

Nature News, 13MAR2012

This year, central-government expenditure on science and technology is set to rise to 228.5 billion renminbi (US\$36.1 billion), a 12.4% increase from last year. Of that science budget, 32.5 billion renminbi will go towards basic research, a 10.1% increase. An additional 10.1 billion renminbi, a 53% increase, is devoted to developing new agricultural technologies and modernizing China's seed industry. Other areas likely to receive increased support include information technology, drug discovery, regenerative medicine, renewable energy and the exploitation of mineral and fuel resources.

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

The 'most important questions' in science policy shortlisted

Nature News, 13MAR2012

A series of bitter disagreements between scientists and policy-makers [in UK] has prompted a group of researchers to create a list of 40 "key unanswered questions" in an attempt to ease tensions by setting an agenda for future work. The questions are grouped into six broad themes, such as "understanding the role of scientific evidence in policymaking" and "democratic governance of scientific advice". [ARTICLE: William J. Sutherland, et al. A Collaboratively-Derived Science-Policy Research Agenda](#)

Tags: S&T policy, S&T UK

SCIENCE WITHOUT BORDERS

Experts Confer on "Rules of the Road" for Outer Space Activities

Newswise, 13MAR2012

A draft Code was published by the European Union (EU) in 2008, with a revised draft released in September 2010. To review the current status of the EU's Code of Conduct, Secure World Foundation (SWF) brought together experts on March 8 in Brussels, Belgium to take part in a special panel. By way of international cooperation and open discussion on the Code, a satisfactory outcome could be expected.

Tags: Science without borders, Space technology

Laser lightning rod: Guiding bursts of electricity with a flash of light

e! Science News, 13MAR2012

French researchers have coaxed laboratory-generated lightning into striking the same place, not just twice, but over and over. This feat of electrical reorientation used femtosecond pulses of laser light to create a virtual lightning rod out of a column of ionized gas. This is the first time that these laser-induced atmospheric filaments were able to redirect an electrical discharge away from its intended target and guide it to a normally less-attractive electrode.

Tags: Science without borders

The shape of things to come

EurekaAlert, 12MAR2012

In complex systems such as oceans and the atmosphere, there are a lot of features that we can't understand off-hand, but it turns out, when you look at the data sets, you can find hidden patterns in the way that the air and water move. Over the past decade, using Lagrangian Coherent Structures, researchers at the University of Miami and McGill University have developed mathematical methods to predict the movement of oil in water that are equally applicable to the spread of ash in the air, following a volcanic explosion.

Tags: Science without borders, Mathematics

World breakthrough on salt-tolerant wheat

e! Science News, 11MAR2012

A team of Australian scientists at the University of Adelaide has bred salt tolerance into a variety of durum wheat that shows improved grain yield by 25% on salty soils.

Tags: Science without borders

Tracking pedestrians indoors using their smart phones

Science Daily, 09MAR2012

The next generation of smart phone could combine the data from its gyroscopes with a built-in compass to allow you to track your movements when indoors even without GPS. Such a system could be useful for shopping mall managers, factory bosses for worker safety and security and office workers hoping to manage the flow of people through buildings.

Tags: Science without borders

Stumped by a Problem? This Technique Unsticks You

Science Newline, 07MAR2012

There's a classic obstacle to innovation called 'functional fixedness,' which is the tendency to fixate on the common use of an object or its parts. It hinders people from solving problems. Researchers at the University of Massachusetts have developed a systematic way of overcoming that obstacle: the "generic parts technique" (GPT). Here's how

GPT works: For each object in your problem, you break it into parts and ask two questions: 1. Can it be broken down further? and 2.— this is the one that's been overlooked— Does my description of the part imply a use?

Tags: Science without borders

SENSORS

Carbon nanotubes increase the speed of biological nanotechnology sensors

Nanowerk, 09MAR2012

The key to the new technology, the researchers say, is the unusual capability of carbon nanotubes. The nanotubes change their electrical resistance when a protein lands on them, and the extent of this change can be measured to determine the presence of a particular protein. The newest advance was the creation of a way to keep proteins from sticking to other surfaces. The new findings should find applications not only in medicine but in toxicology, environmental monitoring, new drug development and other fields. TECHNICAL ARTICLE: Matthew R. Leyden, et al, Increasing the detection speed of an all-electronic real-time biosensor

Tags: Sensors, Biotechnology, CNT, Nanomaterials

Introducing plug-and-play nanoelectromechanical systems (NEMS)

Nanowerk, 08MAR2012

The most important part of the nanosensor is a thin beam of highly stressed silicon nitride suspended between two silica supports. The beam is flanked on each side by slightly elevated, parallel gold electrodes. An electric voltage is applied to the two gold electrodes, which act as a capacitor. The resulting electric field couples to the resonator. The effect is utilized to sense its motion. The measurement scheme is based on a simple effect: when the nanobeam oscillates up and down within the electric field, the capacitance between the two electrodes varies slightly. They incorporated a microwave cavity into the design, which allows them to detect even the thermal motion of the suspended nanobeam.

Tags: Sensors

Origami-inspired paper sensor could test for malaria and HIV for less than 10 cents.

EurekaAlert, 08MAR2012

Inspired by the paper-folding art of origami, chemists at The University of Texas at Austin have developed a 3-D paper sensor that may be able to test for diseases such as malaria and HIV for less than 10 cents a pop. A hydrophobic material, such as wax or photoresist, is laid down into tiny canyons on chromatography paper. It channels the sample that's being tested—urine, blood, or saliva, for instance—to spots on the paper where test reagents have been embedded.

Tags: Sensors, Biotechnology

STEM

TED launches TED-Ed educational initiative

KurzweilAI, 13MAR2012

TED-Ed's mission is to capture and amplify the voices of great educators around the world by "pairing extraordinary educators with talented animators to produce a new library of curiosity-igniting videos." A new site, which will launch in early April 2012, will feature videos and some powerful new learning tools. VIDEOS

Tags: STEM ■

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