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S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

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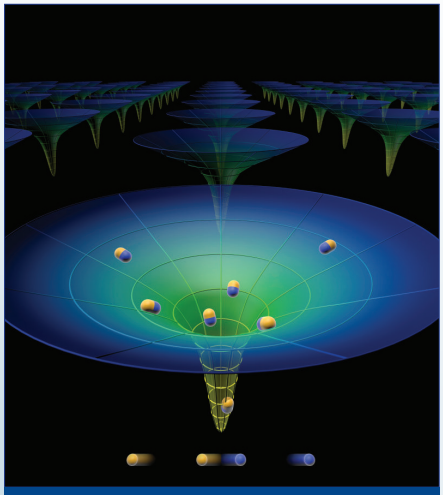

A visualization of the broad-spectrum solar energy funnel. (Credit: Yan Liang; Creative Commons Attribution Non-Commercial No Derivatives license)

Funneling the sun's energy: New way of harnessing photons for electricity proposed

Science Daily, 27NOV2012

The quest to harness a broader spectrum of sunlight's energy to produce electricity has taken a radically new turn, with the proposal of a "solar energy funnel" that takes advantage of materials under elastic strain. The solar-funnel work uses precisely controlled elastic strain to govern electrons' potential in the material. The MIT research team used computer modeling to determine the effects of the strain on a thin layer of molybdenum disulfide (MoS2), a material that can form a film just a single molecule (about six angstroms) thick. TECHNICAL ARTICLE

Tags: Energy, Featured Article

Proving quantum computers feasible

MIT News, 27NOV2012

An international team of researchers proved that even in simple spin chains, the degree of entanglement scales with the length of the chain. The current research showed that unbounded entanglement is possible in chains of particles with only three spin states—up, down and none. Systems of such particles should, in principle, be much easier to build than those whose particles have more spin states.

Tags: Quantum science, Featured Article

New device hides, on cue, from infrared cameras

Science Daily, 26NOV2012

A new device can absorb 99.75 percent of infrared light that shines on it. When activated, it appears black to infrared cameras. Composed of just a 180-nanometer-thick layer of vanadium dioxide (VO2) on top of a sheet of sapphire, the device reacts to temperature changes by reflecting dramatically more or less infrared light. TECHNICAL ARTICLE

Tags: Imaging technology, Featured Article

S&T News Articles

ADVANCED MANUFACTURING

New computerized approach could revolutionize design and manufacturing

EurekAlert, 27NOV2012

Virtually all of the design, testing, error identification and revisions will be done on a computer up to the point of commercial production. In theory, a new machine should work right the first time, and perform exactly as the computer said it would. The concept is called "model based design and verification," and is getting initial impetus from a design challenge sponsored by the U.S. military, which wants a new amphibious vehicle in about one-fifth of the time it would ordinarily take to build it. They also want lower cost and excellent performance.

Tags: Advanced manufacturing

Engineers pave the way towards 3-D printing of personal electronics

Science Daily, 26NOV2012

Researchers in the UK have created a simple and inexpensive conductive plastic composite that can be used to produce electronic devices using the latest generation of low-cost 3D printers designed for use by hobbyists and even in the home. TECHNICAL ARTICLE

Tags: Advanced manufacturing, S&T UK

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ADVANCED MATERIALS

Materials for next generation transparent conductors

Science Daily, 26NOV2012

Researchers in Singapore are working on new sustainable nanomaterials, processes and devices for transparent conductors used to make cheaper and more efficient electronics and organic solar cells.

Tags: Advanced materials

AUTONOMOUS SYSTEMS & ROBOTICS

Video Monday: Rat Heart Robots, Cheap UAVs, and Disney's Humanoid

IEEE Spectrum, 26NOV2012

Disney Research robotics division has a humanoid in the works and they've already taught it to throw and catch. The notable thing here is how interactive the robot is: untrained humans are able to play games with the robot, and as the video shows, the humans readily talk to the robot.

Tags: Autonomous systems & robotics

BIOTECHNOLOGY

New method for diagnosing malaria

Science Daily, 28NOV2012

Danish researchers have developed a new and sensitive method that makes it possible to diagnose malaria from a single drop of blood or saliva. The method might eventually be used in low-resource areas without the need for specially trained personnel, expensive equipment, clean water or electricity. With the development of this method, the researchers hope to go one step further in identifying and treating all patients suffering from malaria. TECHNICAL ARTICLE

Tags: Biotechnology

Making a Flu Vaccine Without the Virus

Wired, 26NOV2012

Researchers in Germany designed a piece of mRNA encoding the hemagglutinin of the influenza strain H1N1. Cells use mRNA to shuttle the information contained in the genome from the nucleus into the periphery of the cell, where it is translated into a protein. By injecting synthetic mRNA into the skin of mice, the researchers coaxed the animals' cells into producing the virus protein themselves. This elicited an immune response that later protected the animals from infection with otherwise lethal doses of influenza virus.

Tags: Biotechnology, Biology

BREAKTHROUGH TECHNOLOGY

The Computer That Stores and Processes Information At the Same Time

MIT Technology Review, 26NOV2012

Researchers in the US outline an emerging form of computation called memcomputing based on the recent discovery of nanoscale electronic components that both store and process information at the same time. At the heart of this new form of computing are the memristor, memcapacitor and meminductor, fundamental electronic components that store information while operating as resistors, capacitors and inductors respectively. These devices were predicted theoretically in the 1970s but only manufactured for the first time in 2008. TECHNICAL ARTICLE

Tags: Breakthrough technology, Information technology

COMMUNICATIONS TECHNOLOGY

China Developing GPS-on-a-Shoestring Plan

MIT Technology Review, 27NOV2012

Instead of creating a fleet of GPS-type satellites, why not broadcast the signals from the ground and route them through existing communications satellites? Indeed, China has already tested the idea. TECHNICAL ARTICLE

Tags: Communications Technology, S&T China

COUNTER WMD

Developing 'second skin' military nanotechnology fabric to repel chemical and biological agents

Nanowerk, 27NOV2012

Military uniforms of the future may offer a new layer of protection to wearers thanks to research at the UMass Amherst and elsewhere, developing a nanotube-based fabric that repels chemical and biological agents.

Tags: Counter WMD, Advanced materials

ENERGY

Scientists test novel power system for space travel (w/ video)

PhysOrg.com, 26NOV2012

Current space missions typically use power supplies that generate about the same amount of electricity as one or two household light bulbs. A team of researchers at Los Alamos National Laboratory demonstrated the first use of a heat pipe to cool a small nuclear reactor and power a Stirling engine at the Nevada National Security Site's Device Assembly Facility near Las Vegas.

Tags: Energy

Nanotechnology windows generate electricity from outside heat

Nanowerk Spotlight, 25NOV2012

Researchers at KAUST (King Abdullah University) explored a novel idea to integrate micro- to nanoscale thermo-electric materials with the window glasses to generate thermoelectricity based on the temperature difference that exists between the hot outside and relatively cold inside. TECHNICAL ARTICLE

Tags: Energy

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"We are trying to prove ourselves wrong as quickly as possible, because only in that way can we find progress." RICHARD FEYNMAN

IMAGING TECHNOLOGY

Low-cost, finger-nail sized radar

Science Daily, 26NOV2012

Developed in the 'Silicon-based ultra-compact cost-efficient system design for mm-wave sensors' (Success) project, the device is the most complete silicon-based 'system-on-chip' (SoC) package for radar operating at high frequencies beyond 100 GHz. Measuring just 8 mm by 8 mm, the chip package is the culmination of three years of research by nine academic and industrial partners across Europe.

Tags: Imaging technology, S&T EU

INFORMATION TECHNOLOGY

Fast forward to the past: NASA technologists test 'game-changing' data-processing technology

Science Daily, 28NOV2012

It's a digital world. Or is it? NASA technologist Jonathan Pellish isn't convinced. In fact, he believes a computing technology of yesteryear could potentially revolutionize everything from autonomous rendezvous and docking to remotely correcting wavefront errors on large, deployable space telescope mirrors like those to fly on the James Webb Space Telescope.

Tags: Information Technology, NASA

MATERIALS SCIENCE

Modeling the breaking points of metallic glasses

Science Daily, 26NOV2012

Metallic glass alloys (or liquid metals) are three times stronger than the best industrial steel, but can be molded into complex shapes with the same ease as plastic. These materials are highly resistant to scratching, denting, shattering and corrosion. Mathematical methods developed by scientists will help explain why liquid metals have wildly different breaking points. TECHNICAL ARTICLE

Tags: Materials science, Government S&T

Sieve holds nanoparticles and acts as solar absorber

Nanowerk, 26NOV2012

Researchers in Germany biofunctionalized macroporous polymeric membranes and added a commercially available protein to the fibres. They found that the protein undergoes a conformational change under water, and its ability to capture all the metal nanoparticles during the filtration process is activated. This makes a novel filter for nanoparticles in aqueous solutions. TECHNICAL ARTICLE

Tags: Materials science

Why radiation doesn't damage these materials

Futurity.org, 20NOV2012

During nuclear irradiation, energetic particles displace atoms from their regular lattice sites within the metals setting off cascades of collisions that ultimately damage materials such as steel. One of the byproducts of this process is the formation of helium bubbles which do not dissolve within solid materials, it forms pressurized gas bubbles that can coalesce, making the material porous, brittle, and susceptible to breakage. Some nano-engineered materials are able to resist such damage and may, for example, prevent helium bubbles from coalescing into larger voids.

Tags: Materials science

MICROELECTRONICS

Terahertz wafer scanner from ARP detects chip defects down to 1 nm by Administrator

THz Science and Technology Network, 27NOV2012

ARP (Applied Research & Photonics) has introduced a non-destructive sub-surface terahertz wafer scanner with a resolution of 1 nm by using its continuous-wave (CW) terahertz technology decreasing rejects in wafer fabrication.

Tags: Microelectronics, Terahertz technology

Metamaterials manipulate light on a microchip

Science Daily, 26NOV2012

Using a combination of the new tools of metamaterials and transformation optics, engineers at Penn State have developed designs for miniaturized optical devices that can be used in chip-based optical integrated circuits. TECHNICLA ARTICLE

Tags: Microelectronics

The China Chip Advances—and May Compete with Intel Soon

MIT Technology Review, 26NOV2012

The processors at the heart of computers and mobile devices today come in two basic flavors: Intel- and ARM-compatible. A Chinese company, BLX IC Design Corporation, is trying to establish a third type of processor, a new chip in a family of designs known as Loongson that is intended to drive PCs, servers, and supercomputers.

Tags: Microelectronics, S&T China

Smallest logic circuit fabricated with single-electron transistors

PhysOrg.com, 21NOV2012

We made the first successful implementation of a one-electron-based half-adder (HA) that is the smallest

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arithmetic block for the single-electron transistor (SET) multi-valued (MV) logic family. The one-electron HA operates at nA-levels with low-power consumption. Moreover, the HA has two additional functionalities: multi-valued and flexible. Therefore, the one-electron HA cell will provide a basis for ultra-high density and low-power ultra-large-scale integration. TECHNICAL ARTICLE

Tags: Microelectronics

Featured Resource

Report Linker

Reportlinker is a search engine, which provides access to the largest online collection of Industry, company and country reports available. It provides full access to more than 1 million reports, published by 200,000 reliable public sources.

NEUROSCIENCE

Human Performance Modification: Review of Worldwide Research with a View to the Future

National Research Council, 27NOV2012

Based on its review of the literature, the presentations it received and on its own expertise, the Committee on Assessing Foreign Technology Development in Human Performance Modification chose to focus on three general areas of HPM: human cognitive modification as a computational problem, human performance modification as a biological problem, and human performance modification as a function of the brain-computer interface. REPORT

Tags: Neuroscience, Military technology

Here comes the chance to fly your own brain-controlled toy helicopter (w/video)

Nanowerk, 24NOV2012

PuzzleBox is making a finished product available to the public, while still freely releasing all source code, available hardware schematics, 3D models, and so on. The goal is to provide a fun toy as well as an educational introduction to BCI and neuroscience.

Tags: Neuroscience

Rhythmic brain waves: Fluctuations in electrical activity may allow brain to form thoughts and memories

Science Daily, 21NOV2012

A new study sheds light on how neural ensembles form thoughts and support the flexibility to change one's mind. Researchers identified groups of neurons that encode specific behavioral rules by oscillating in synchrony with each other. The results suggest that the nature of conscious thought may be rhythmic TECHNICAL ARTICLE

Tags: Neuroscience

QUANTUM SCIENCE

Finding Quantum Keys in Noisy Fibers

American Physical Society Spotlight, 26NOV2012

Researchers in the UK have devised a temporal filtering scheme for separating keys from data. Using multiple wavelength channels, the researchers sent a key on a fiber with bidirectional data traffic. The dominant noise in the key channel came from inelastic (Raman) scattering out of the data channels. To filter this out, the team installed subnanosecond gated photodiodes that captured the key-carrying laser pulse, while ignoring much of the random (time-independent) scattering. The results support the prospects of quantum key distribution over metropolitan networks. TECHNICAL ARTICLE

Tags: Quantum science

S&T POLICY

Inside Germany's Bold Plan to Tap Deep-Sea Resources

Wired, 27NOV2012

Germany's Helmholtz Centre for Ocean Research in Kiel (GEOMAR) is firmly behind the mining of deep-sea sulfides, which could provide economically viable quantities of copper, zinc, gold, silver, indium, germanium, and gallium. Thirty-five hundred meters beneath the surface of the ocean, hydrothermal vents are spewing minerals from mid-ocean ridges, creating billowing plumes of photogenic "black smoke" and providing chemical energy for one of the most unique and unexpected ecosystems on the planet.

Tags: S&T policy, S&T Germany

Russia to Bolster Long-Range Deterrent, Deploy Missile Detection Satellites

Global Security Newswire, 27NOV2012

The nation is set in this decade to deploy in excess of 100 orbital instruments, including a number of missile launch detection satellites. "Based on the state armament program through 2020, we need to launch more than 100 new spacecraft, including for the purposes of missile defense, reconnaissance, communications, cartography and navigation," ITAR-Tass reported.

Tags: S&T policy, S&T Russia

Top centres are a Norwegian research success story

Alpha Galileo Foundation, 23NOV2012

Generous, long-term financing of research centres has facilitated the 13 initial Norwegian Centres of Excellence (SFF centres) to leave a lasting footprint. The SFF centre scheme has given dynamic research groups the stability and opportunity to give it their all.

Tags: S&T policy

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SCIENCE WITHOUT BORDERS

The lab labyrinth: what makes a good digital innovation incubator?

Wired UK, 28NOV2012

There is a clear role and benefit to incubator and lab divisions focused squarely on innovation and exploring how technology and consumer changes can inspire new products and ways of doing things. The article explores different models for driving IP creation, and the different types of benefits they're engendering—both from a financial and talent cultivation perspective.

Tags: Science without borders

Astrophysicists on the Verge of Spotting Gravitational Waves

MIT Technology Review, 26NOV2012

Researchers at Princeton University say that astrophysicists have severely underestimated the frequency of these upheavals. Their calculations suggest that galaxy mergers are an order of magnitude more frequent than had been thought. Consequently, collisions between supermassive black holes must be more common too. TECHNICAL ARTICLE

Tags: Science without borders

Cambridge centre to investigate inevitability of robot uprising

Wired UK, 26NOV2012

The Centre for the Study of Existential Risk at the University of Cambridge aims to study and mitigate any "extinction-level risks to our species as a whole" associated with technological advances across a number of fields.

Tags: Science without borders

SENSORS

Sentry System Combines a Human Brain with Computer Vision

MIT Technology Review, 27NOV2012

A DARPA project suggests a mix of man and machine may be the most efficient way to spot danger. The Cognitive Technology Threat Warning System consists of a wide-angle camera and radar, which collects imagery for humans to review on a screen, and a wearable electroencephalogram device that measures the reviewer's brain activity. This allows the system to detect unconscious recognition of changes in a scene—called a P300 event.

Tags: Sensors, DARPA, Government S&T

Nanotech device mimics dog's nose to detect explosives

Science Daily, 26NOV2012

Engineers have designed a detector that uses microfluidic nanotechnology to mimic the biological mechanism behind canine scent receptors. The device is both highly sensitive to trace amounts of certain vapor molecules, and able to tell a specific substance apart from similar molecules. TECHNICAL ARTICLE

Tags: Sensors

Sensor detects bombs on sea floor

EurekAlert, 26NOV2012

The method for finding undetonated underwater explosives is very similar to that used to detect underground mineral deposits. The highly sensitive sensor developed by researchers in Australia—the high temperature superconducting tensor gradiometer—delivers significantly more information about the target's magnetic field than conventional sensors used for this type of detection. It provides data on the location, characterisation and magnetic qualities of a target—whether it is a gold deposit or an explosive.

Tags: Sensors ■

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