Volume 3, Issue 43 ■ 25OCT2013

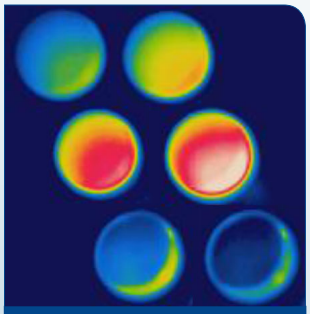
S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

Feature Articles

A chameleon in the physics lab

Harvard University, 21OCT2013



A new coating intrinsically conceals its own temperature to thermal cameras. (Image courtesy of Mikhail Kats.)

Researchers at Harvard University found that the secret to the technology lies within a very thin film of vanadium oxide, an unusual material that undergoes dramatic electronic changes when it reaches a particular temperature. With only small adjustments the coating could be used as a new type of thermal camouflage or as a kind of encrypted beacon to allow soldiers to covertly communicate their locations in the field. TECHNICAL ARTICLE

Tags: Sensors, Breakthrough technology, Featured Article

New physical phenomenon could drastically reduce energy consumption by computers

Nanowerk, 21OCT2013

Using neutron radiation even the tiniest of currents is sufficient to move the magnetic eddies. Now researchers in Germany have developed a method by which skyrmions can be moved and measured in a purely electronic manner. TECHNICAL ARTICLE

Tags: Information Technology, S&T Germany, Featured Article

Scientists Show Heisenberg's Intuition Correct

Science Daily, 17OCT2013

Werner Heisenberg claimed that it is impossible to observe physical objects without affecting them in a significant way and that this fact could be expressed as an uncertainty relation, describing a reciprocal relation between the accuracy in position and the disturbance in momentum. An international team of researchers from the UK, Finland and Germany have finally provided a precise formulation and proof of the error-disturbance relation. TECHNICAL ARTICLE

Tags: Science without borders, S&T Finland, S&T Germany, S&T UK, Featured Article

S&T News Articles

ADVANCED MANUFACTURING

4-D Printing Technology for Composite Materials Developed

Science Daily, 22OCT2013

Researchers at the University of Colorado Boulder have successfully added a fourth dimension to their printing technology, opening up exciting possibilities for the creation and use of adaptive, composite materials in manufacturing, packaging and biomedical applications. TECHNICAL ARTICLE

Tags: Advanced manufacturing

Manufacturing Auto Parts in a Single Step

Science Daily, 21OCT2013

The current process to manufacture parts for the automotive industry usually consists of three or four steps. Researchers in Spain are exploring the possibility of modifying this process by basing it on thixoforming technology.

Tags: Advanced manufacturing

ADVANCED MATERIALS

Nanodiamonds Made Under Ambient Conditions

Science Daily, 21OCT2013

Researchers at Case Western Reserve University have developed a way to cheaply make nanodiamonds on a lab bench at atmospheric pressure and near room temperature. The nanodiamonds are formed directly from a gas and require no surface to grow on. The discovery holds promise for coating plastics with ultrafine diamond powder and making flexible electronics and other products that take advantage of diamond's exceptional properties. TECHNICAL ARTICLE

Tags: Advanced materials, Materials science

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NTU Scientists Make Breakthrough Solar Technology

Science Newsline, 21OCT2013

Researchers in Singapore have created a next generation solar cell, made from organic-inorganic hybrid perovskite materials. It is about five times cheaper than current thin-film solar cells, due to a simpler solution-based manufacturing process. TECHNICAL ARTICLE

Tags: Advanced materials, Solar energy

Scientists untangle nanotubes to release their potential in the electronics industry

EurekAlert, 21OCT2013

Researchers in the UK have shown that by giving the nanotubes an electrical charge, they were able to pull apart individual strands. Using this method, nanotubes can be sorted or refined, then deposited in a uniform layer onto the surface of any object.

Tags: Advanced materials, S&T UK

Mixing Nanoparticles to Make Multifunctional Materials

Science Daily, 20OCT2013

Researchers at Brookhaven National Laboratory have developed a general approach for combining different types of nanoparticles to produce large-scale composite materials. The technique opens many opportunities for mixing and matching particles with different magnetic, optical, or chemical properties to form new, multifunctional materials or materials with enhanced performance for a wide range of potential applications. TECHNICAL ARTICLE

Tags: Advanced materials, Government S&T, Materials science

Nano-cone textures generate extremely 'robust' water-repellent surfaces (w/video)

Nanowerk, 20OCT2013

The procedure for creating superhydrophobic nanostructured surfaces, developed by researchers at Brookhaven National Laboratory, takes advantage of the tendency of "block copolymer" materials to spontaneously self-organize through a mechanism known as microphase separation. The material may have a broad range of applications where water-resistance is important, including power generation and transportation. TECHNICAL ARTICLE

Tags: Advanced materials, Government S&T, Materials science

AUTONOMOUS SYSTEMS & ROBOTICS

Video Friday: Drone Delivery, Amphibious Quadrupeds, and Boyfriend Prank

IEEE Spectrum, 18OCT2013

The DARPA Robotics Challenge in December is going to pit a horde of Atlas robots from the Track B and Track C teams against a variety of other robots from the Track A teams. Team DRC-Hubo might be feeling a little bit like an underdog, but they're not going to let that stop them.

Tags: Autonomous systems & robotics

BIG DATA

Managing the Deluge of 'Big Data' from Space

Science Daily, 21OCT2013

JPL is involved with archiving the array's torrents of images: 700 terabytes of data are expected to rush in every day. That's equivalent to all the data flowing on the Internet every two days. Rather than build more hardware, engineers are busy developing creative software tools to better store the information, such as "cloud computing" techniques and automated programs for extracting data.

Tags: Big data, Government S&T

BIOTECHNOLOGY

Craig Venter's 'biological teleportation' device

KurzweilAI, 22OCT2013

Craig Venter has built a prototype of a "Digital Biological Converter" (DBC) that would allow what he calls "biological teleportation:" receiving DNA sequences over the Internet to synthesize proteins, viruses and even living cells.

Tags: Biotechnology

Researchers Advance Toward Engineering 'Wildly New Genome'

Science Daily, 17OCT2013

Researchers at Harvard University have created new genomes inside the bacterium E. coli in ways that test the limits of genetic reprogramming and open new possibilities for increasing flexibility, productivity and safety in biotechnology. TECHNICAL ARTICLE

Tags: Biotechnology, Biology

CYBER SECURITY

Chemical passwords could lead to unbreakable molecular lock

PhysOrg.com, 22OCT2013

The molecular keypad lock developed by researchers in Israel is based on a combinatorial fluorescent molecular sensor that essentially acts as a molecular "nose" or "tongue" by sensing different chemicals. Unlike most fluorescent molecular sensors that generate discrete optical signals, this sensor can generate unique optical "signatures" for different chemicals, similar to the way the olfactory system operates. TECHNICAL ARTICLE

Tags: Cyber security

DARPA Announces Cyber Grand Challenge

DARPA News, 22OCT2013

DARPA intends to hold the Cyber Grand Challenge (CGC)—the first-ever tournament for fully automatic network defense systems. DARPA envisions teams creating automated systems that would compete against each other to evaluate software, test for vulnerabilities, generate security patches and apply them to protected computers on a network. Challenge website

Tags: Cyber security

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"There is no adequate defense, except stupidity, against the impact of a new idea."

PERCY WILLIAMS BRIDGMAN

Ship Tracking Hack Makes Tankers Vanish from View

MIT Technology Review, 21OCT2013

Researchers with the computer security company Trend Micro discovered the problem which stems from a lack of security controls in a technology known as Automatic Identification System, or AIS, used by an estimated 400,000 ships worldwide.

Tags: Cyber security

ENVIRONMENTAL SCIENCE

Pacific Ocean Temperature Influences Tornado Activity in US

Science Daily, 17OCT2013

Researchers at the University of Missouri surveyed 56,457 tornado-like events from 1950 to 2011. They found that when surface sea temperatures were warmer than average, the U.S. experienced 20.3 percent more tornados that were rated EF-2 to EF-5 on the Enhanced Fuijta (EF) scale.

Tags: Environmental science, Climatology

INFORMATION TECHNOLOGY

Million-Year Data Storage Disk Unveiled

MIT Technology Review, 21OCT2013

Researchers in the Netherlands have designed and built disks and performed accelerated ageing tests which show it should be able to store data for 1 million years and possibly longer. This is based on the idea that data must be stored in an energy minimum that is separated from other minima by an energy barrier. So to corrupt data by converting a 0 to a 1, for example, requires enough energy to overcome this barrier. TECHNICAL ARTICLE

Tags: Information Technology, Breakthrough technology

Graphics Chips Help Process Big Data Sets in Milliseconds

MIT Technology Review, 18OCT2013

Known as MapD, or massively parallel database, the new technology achieves big speed gains by storing data in the onboard memory of graphics processing units (GPUs) instead of in central processing units (CPUs), as is conventional. Using a single high-performance GPU card can make data processing up to 70 times faster.

Tags: Information Technology

MATERIALS SCIENCE

Cheap Metals Can Be Used to Make Products from Petroleum

Science Daily, 21OCT2013

Researchers at the University of Illinois at Chicago developed a way to use copper and iron together to replace the extremely rare metal catalyst iridium, which is used in a chemical process called borylation. Adding a boron atom to carbon is the first step in the synthesis of many products, from chemotherapy drugs to adhesives and polymers. TECHNICAL ARTICLE

Tags: Materials science

Tiny 'LEGO Brick' -Style Studs Make Solar Panels a Quarter More Efficient

Science Daily, 18OCT2013

An international team of researchers (UK, Belgium, Japan, China) have demonstrated that the efficiency of all solar panel designs could be improved by up to 22 per cent by covering their surface with aluminium studs that bend and trap light inside the absorbing layer. TECHNICAL ARTICLE

Tags: Materials science, Energy, Solar energy

A Grand Unified Theory of Exotic Superconductivity?

Science Daily, 17OCT2013

Researchers from the DOE's Brookhaven Lab and Berkeley Lab, the University of Cornell and UC, Berkeley, postulate a set of key principles for understanding the superconductivity and the variety of "intertwined" electronic phenomena that applies to all the families of high-Tc superconductors. TECHNICAL ARTICLE

Tags: Materials science, Government S&T

Using heat to make magnets

PhysOrg.com, 17OCT2013

Researchers in Switzerland have provided the first evidence ever that it is possible to generate a magnetic field by using heat instead of electricity. The phenomenon is referred to as the Magnetic Seebeck effect or 'thermomagnetism'. TECHNICAL ARTICLE

Tags: Materials science, S&T Switzerland

Why Lithium Ion Batteries Fail

Science Daily, 17OCT2013

Materials in lithium ion battery electrodes expand and contract during charge and discharge. These volume changes drive particle fracture, which shortens battery lifetime. For the first time researchers in Switzerland have

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quantified this effect using high-resolution 3D movies recorded using x-ray tomography. TECHNICAL ARTICLE

Tags: Materials science, Energy

Bending World's Thinnest Glass Shows Atoms' Dance

Science Daily, 15OCT2013

An international research team (US, Germany) has used an electron microscope to bend, deform and melt one-molecule-thick glass, showing how it breaks atom by atom. These insights may eventually lead to atom-by-atom designs for stronger glass panes or more robust transistors. TECHNICAL ARTICLE

Tags: Materials science

Featured Resource

Technology Org

Provides news from different sources on topics ranging from pure technical disciplines to natural and social sciences. RSS

MICROELECTRONICS

How Wetware Can Help Hardware Makers Beat Moore's Law, Save Energy

IEEE Spectrum, 22OCT2013

Co-located cortices and capillaries keep our neurons powered and cooled with minimal fuss. Yet today's computers dedicate around 60 percent of their volume to getting electricity in and heat out compared to perhaps 1 percent in a human brain. IBM's long-term plan is to help computers achieve human-like space- and energy efficiency. The tool: a kind of electronic blood.

Tags: Microelectronics, S&T Switzerland

New Device Stores Electricity On Silicon Chips

Science Daily, 22OCT2013

Researchers at Vanderbilt University have designed a supercapacitor that is made out of silicon so it can be built into a silicon chip along with the microelectronic circuitry that it powers. In fact, it should be possible to construct these power cells out of the excess silicon that exists in the current generation of solar cells, sensors, mobile phones and a variety of other electromechanical devices. TECHNICAL ARTICLE

Tags: Microelectronics

Atomically thin device promises new class of electronics

EurekAlert, 21OCT2013

Northwestern University researchers have taken a significant step toward fabricating complex nanoscale electronics. By integrating two atomically thin materials—molybdenum disulfide and carbon nanotubes—they have created a p-n heterojunction diode, an interface between two types of semiconducting materials. TECHNICAL ARTICLE

Tags: Microelectronics

NEUROSCIENCE

Activating Proteins in Brain by Shining LED Light On Them

Science Daily, 17OCT2013

Relying on specially engineered amino acids, researchers at the Salk Institute for Biological Studies, California, can change the shape of a protein in the brain of a mouse, turning on the protein at the precise moment they want. This allows the scientists to observe the exact effect of the protein's activation. TECHNICAL ARTICLE

Tags: Neuroscience

PHOTONICS

Topological Light: Living On the Edge

Science Daily, 21OCT2013

Researchers at the University of Maryland report the first observation of topological effects for light in two dimensions. They directly observed light racing around the boundary, impervious to defects. These photonic "edge states" are directly analogous to the quantum Hall effect for electrons. TECHNICAL ARTICLE

Tags: Photonics

Transformation optics: Gravitational lens on a chip

Nature Photonics, 20OCT2013

Massive objects in space act as gravitational lenses, bending and focusing light. Scientists have now created a photonic analogue of a gravitational lens on a chip, and have shown that it is strong enough to force light into orbits.

Tags: Photonics

QUANTUM SCIENCE

New particle might make quantum condensation at room temperature possible

PhysOrg.com, 18OCT2013

Researchers in Spain have identified a new type of particle that might make quantum condensation possible at room temperature. The particles, so called PEPs, could be used for fundamental studies on quantum mechanics and applications in lasers and LEDs.

Tags: Quantum science

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Quantum particles find safety in numbers

PhysOrg.com, 16OCT2013

Researchers in Germany have uncovered a novel effect that, in principle, offers a means of stabilizing quantum systems against decoherence. The discovery could represent a major step forward for quantum information processing. TECHNICAL ARTICLE

Tags: Quantum science

STEM

A Lost Generation of Young Scientists? Grad Student Voices Concern About Research Funding Crunch

Science Daily, 17OCT2013

A researcher from the University of Michigan describes the potential effect of ongoing instability in research funding—and highlights the very real impact that today's science funding climate is having on the daily lives and career plans of young researchers-in-training. TECHNICAL ARTICLE

Tags: STEM, S&T Policy ■

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