



S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

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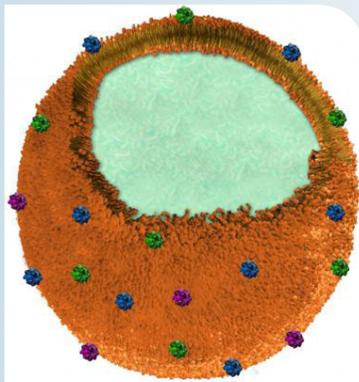
FEATURE ARTICLES

[Small in size, big on power: New microbatteries the most powerful yet](#)

[Science Daily, 16APR2013](#)

The batteries developed by researchers at the University of Illinois, Urbana-Champaign owe their high performance to their internal three-dimensional microstructure. Two key components are: the anode and cathode. Building on a novel fast-charging cathode design the researchers developed a matching anode and then developed a new way to integrate the two components at the microscale to make a complete battery with superior performance. [TECHNICAL ARTICLE](#)

Tags: Energy, Battery, Featured Article



Engineers at the University of California, San Diego have invented a "nanosponge" capable of safely removing a broad class of dangerous toxins from the bloodstream, including toxins produced by MRSA, E. Coli, poisonous snakes and bees. The nanosponges are made of a biocompatible polymer core wrapped in a natural red blood cell membrane. (Image: Zhang Research Lab)

[Nanosponges soak up toxins released by bacterial infections and venom in the blood](#)

[Nanowerk, 14APR2013](#)

A nanosponge, invented by researchers at UC, San Diego, has a diameter of approximately 85 nanometers and is made of a biocompatible polymer core wrapped in segments of red blood cells membranes. Based on test-tube experiments, the number of toxins each nanosponge could absorb

depended on the toxin. For example, approximately 85 alpha-haemolysin toxin produced by MRSA, 30 streptolysin-O toxins and 850 melittin monomers, which are part of bee venom. [TECHNICAL ARTICLE](#)

Tags: Advanced materials, Biomimetics, Featured Article

[Topological insulator created for light](#)

[Physics World, 10APR2013](#)

An optical analogue of a topological insulator has been created by researchers in Israel and Germany. Consisting of an array of helical waveguides, light cannot propagate between waveguides in the bulk of the array but it can move unhindered along its surfaces—even when the light encounters significant surface defects. [TECHNICAL ARTICLE](#)

Tags: Communications Technology, Optical communication, S&T Germany, Featured Article

S&T NEWS ARTICLES

ADVANCED MATERIALS

[New material gets itself into shape](#)

[Science Daily, 16APR2013](#)

Researchers in Switzerland developed a material in the lab by adding ultrafine aluminium oxide platelets as the rigid component to gelatine—the swellable base material—and pouring it into square moulds. The surface of the aluminium oxide platelets is pre-coated with iron oxide nanoparticles to make them magnetic. This enabled the researchers to align the platelets in the desired direction using a very weak rotating magnetic field. [TECHNICAL ARTICLE](#)

Tags: Advanced materials

[Can new plasma-based biomaterials speed healing of injured tissues?](#)

[EurekaAlert, 15APR2013](#)

A new solid form of bioactive plasma-based biomaterials, known as PBMs, developed by a team of researchers led by Carnegie Mellon University can accelerate tissue healing. Not only are PBMs easier to work with, inexpensive to produce, and safe to use, they are available as off-the-shelf products. [TECHNICAL ARTICLE](#)

Tags: Advanced materials

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Graphene plasmonics: Damping of plasmons in graphene

Nature Photonics, 14APR2013

The damping of surface plasmons hinders the realization of nanophotonic devices. Researchers in Croatia have now uncovered some of the mid-infrared damping mechanisms for plasmons in graphene, which offer a number of unique and interesting properties.

Tags: *Advanced materials*

Plasmonics: A flexible bridge between two worlds

Science Daily, 14APR2013

Researchers in Singapore, in collaboration with US scientists, have identified that BiFeO₃ has the potential to be used to efficiently couple light to electrical charges through plasmons. The coupling could be activated, controlled and switched off, on demand, by applying an electrical field to an active plasmonic device based on BiFeO₃. TECHNICAL ARTICLE

Tags: *Advanced materials, Materials science*

Controlling shape of lead nanoparticles by sunlight

Nanowerk, 13APR2013

Indian researchers have controlled shape of lead nanoparticles by using sunbeams. They synthesized Pb spherical nanoparticles by electrolysis method using a bioactive compound aqueous extract. The nanomaterial has potential applications in lead batteries, catalysis, superconductor and photonic crystal. TECHNICAL ARTICLE

Tags: *Advanced materials, Materials science*

Roadblocks to Spin Travel in Graphene

American Physical Society Spotlight, 12APR2013

Experiments have consistently shown that a measure of how long a spin-current stays polarized—the spin-relaxation time—is as much as 1000 times lower in graphene than predicted. Researchers in Canada present experiments showing that, contrary to what was previously thought, magnetic defects may be what's hindering graphene's performance. TECHNICAL ARTICLE

Tags: *Advanced materials*

AUTONOMOUS SYSTEMS & ROBOTICS

Video Friday: Anti-Drone Lasers, Robot Doctors, and Ikea Furniture Assembly

IEEE Spectrum, 12APR2013

What happens when you mix anti-robot lasers with robot doctors and Ikea? Video Friday!

Tags: *Autonomous systems & robotics*

COMMUNICATIONS TECHNOLOGY

Researchers Create Novel Optical Fibers

Newswise, 16APR2013

Researchers at the University of Wisconsin-Milwaukee have found a new mechanism to transmit light through optical fibers. Their discovery marks the first practical application of a Nobel-Prize-winning phenomenon that was proposed in 1958.

Tags: *Communications Technology*

Diamond as a building material for optical circuits

Science Daily, 11APR2013

A research group in Germany used polycrystalline diamond for the fabrication of wafer-based optomechanical circuits. Even though its crystal structures are more irregular, polycrystalline diamond is robust and thus can be more easily processed. It conducts photons almost as efficiently as the monocrystalline substrate and is suitable for industrial use. TECHNICAL ARTICLE

Tags: *Communications Technology, Optical communication, S&T Germany*

AT&T Researchers Set a Long-Haul Data Record

MIT Technology Review, 10APR2013

The technique should allow 400-gigabit-per-second signals to travel for a distance of 12,000 kilometers—four times the previous distance possible—and it promises faster ocean-crossing transmission without adding more equipment.

Tags: *Communications Technology*

CYBER SECURITY

Airplane Takeover Demonstrated Via Android App

Information Week, 11APR2013

A researcher in Germany developed an Android application, dubbed PlaneSploit. Using this application he employed a Samsung Galaxy smartphone to demonstrate how he could adjust the heading, altitude and speed of a virtual airplane by sending it false navigation data.

Tags: *Cyber security*

ENERGY

Memory effect now also found in lithium-ion batteries

Science Daily, 15APR2013

Scientists in Japan have discovered a memory effect in a lithium-ion battery. It means that when the state of charge is determined from the voltage a large error can be caused by a small deviation in the voltage. This finding is particularly relevant for the use of lithium-ion batteries in the electric vehicle market. TECHNICAL ARTICLE

Tags: *Energy, Battery*

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“Science does not know its debt to imagination.”

RALPH WALDO EMERSON

Innovative self-cooling, thermoelectric system consumes no electricity

Science Daily, 14APR2013

In many cases, heat exchangers with fans are used which need to be powered externally and consume a certain amount of electrical power. Researchers in Spain take advantage of the heat flow emitted by the power converter and transformer to produce the electrical power needed to make the fans work. Thus they achieve the cooling of the device and control its temperature, but without any energy cost.

Tags: Energy

ENVIRONMENTAL SCIENCE

New technique measures evaporation globally

Science Daily, 14APR2013

Researchers at Boston University are the first to develop a method to map evaporation globally using weather stations, which will help scientists evaluate water resource management, assess recent trends of evaporation throughout the globe, and validate surface hydrologic models in various conditions. TECHNICAL ARTICLE

Tags: Environmental science

Satellite sandwich technique improves analysis of geographical data

Science Daily, 09APR2013

Researchers at the University of Cincinnati are developing algorithm to create large, detailed maps of regional temperature fluctuation by combining thermal data from two different types of polar orbiting satellite systems - one system frequently records large images of a region on Earth but in little detail, the other records small images less frequently but in much greater detail.

Tags: Environmental science, Mathematics

GOVERNMENT S&T

Extreme Miniaturization: Seven Devices, One Chip to Navigate without GPS

DARPA News, 11APR2013

DARPA researchers at the University of Michigan have made significant progress with a timing & inertial measurement unit (TIMU) that contains everything needed to aid navigation when GPS is temporarily unavailable. The single chip TIMU prototype contains a six axis IMU (three gyroscopes and three accelerometers) and integrates a highly-accurate master clock into a single miniature system, smaller than the size of a penny.

Tags: Government S&T, DARPA

INFORMATION TECHNOLOGY

System allows multitasking runners to read on a treadmill

EurekaAlert, 15APR2013

A new innovation allows treadmill users to work their bodies and brains at the same time. The system, called ReadingMate, developed by researchers at Purdue University adjusts text on a monitor to counteract the bobbing motion of a runner's head so that the text appears still. The new system allows a treadmill user to read normal-size text on a small monitor mounted in front of the machine. TECHNICAL ARTICLE

Tags: Information Technology

Eyeglasses read to the blind (w/video)

PhysOrg.com, 13APR2013

A unique pair of eyeglasses developed by a Florida International University student team could revolutionize the lives of the blind, enabling them to walk into a library or a store, pick up any book or a can of soup, and read it.

Tags: Information Technology

MATERIALS SCIENCE

A synthesized form of niobium oxide could lead to high-performance supercapacitors

Nanowerk, 14APR2013

Researchers at UCLA synthesized a type of niobium oxide that demonstrates substantial storage capacity through "intercalation pseudocapacitance," in which ions are deposited into the bulk of the niobium oxide in the same way grains of sand can be deposited between pebbles. As a result, electrodes as much as 40 microns thick can quickly store and deliver energy on the same time scales as electrodes more than 100 times thinner. TECHNICAL ARTICLE

Tags: Materials science, Battery

Nanotechnology gradient chip makes it easier to measure chemical reactivity

Nanowerk, 13APR2013

Researchers in the Netherlands have developed a tiny chip that makes it easy to create micrometre scale gradients. Gradients are gradual transitions in specific properties, such as acidity. In many chemical and biological reactions, it is important to know how readily and rapidly the substances involved react with one another. TECHNICAL ARTICLE

Tags: Materials science

Pushing a Fullerene through a Nanotube

American Physical Society Spotlight, 13APR2013

Researchers at Columbia University have shown that fullerene responds in a surprising way to an electric field, allowing the whole structure to be driven in either direction through a narrow channel. Although it's not completely clear why an object with no net charge should respond in this way, the researchers suggest that their discovery could have practical applications, such as delivering drugs by guiding molecules that carry them.

TECHNICAL ARTICLE

Tags: Materials science

Liquid on liquid goes solid

Alpha Galileo Foundation, 11APR2013

A team of researchers from the US, Germany, and Israel observed the formation of an ordered crystal of exactly five atomic layers between two liquids, which acts as a foundation for growing even bigger crystals. The atomic order that develops at such disordered liquid interfaces is of fundamental interest for science and for producing materials and nano-particles. TECHNICAL ARTICLE

Tags: Materials science

FEATURED RESOURCE

Nanowerk Spotlight

Daily Nanowerk-exclusive nanotechnology feature article. Some stories are more like an introduction to nanotechnology, some are about understanding current developments, and some are advanced reviews of leading edge research. [RSS](#)

NEUROSCIENCE

Musicians Who Learn a New Melody Demonstrate Enhanced Skill After a Night's Sleep

Science Daily, 15APR2013

Researchers at the Southern Methodist University found that when two similar melodies were practiced one after the other, followed by sleep, any gains in speed and accuracy achieved during practice diminished overnight. The goal is to understand how the brain decides what to keep, what to discard, what to enhance. TECHNICAL ARTICLE

Tags: Neuroscience

Brain Signature Reveals Our Level of Pain

Science NOW, 14APR2013

Brain scanning study suggests that painful heat excites a specific pattern of neural activity that could hold the key to better diagnosis and treatment of all kinds of pain in the future.

Tags: Neuroscience

Mind-controlled devices reveal future possibilities

PhysOrg.com, 14APR2013

Researchers at the University of Minnesota created a non-invasive brain-computer interface (BCI) that could one day restore mobility and independence for individuals with amputated limbs, paralysis and other impairments that prevent or limit normal movement. With the help of this interface, volunteers have been able to precisely control the flight of simulated and small model helicopters using only their minds.

Tags: Neuroscience

Why your 'seesaw' brain can't stay on task

Futurity.org, 13APR2013

Researchers at the University of Florida are using a new technique to examine how parts of the brain fight for dominance. They examined interactions between a set of areas they call the task control network and another set of areas known as the default mode network. So while the task control network suppresses the default mode network, the default mode network also interferes with the task control network. TECHNICAL ARTICLE

Tags: Neuroscience

QUANTUM SCIENCE

Experimental demonstration of long-distance continuous-variable quantum key distribution

Nature Photonics, 15APR2013

Researchers in France have overcome all previous limitations and demonstrate for the first time continuous-variable quantum key distribution over 80 km of optical fibre. All aspects of a practical scenario are considered, including the use of finite-size data blocks for secret information computation and key distillation. The results correspond to an implementation guaranteeing the strongest level of security for quantum key distribution reported so far for such long distances and pave the way to practical applications of secure quantum communications.

Tags: Quantum science, Communications Technology

Photons run out of loopholes

EurekAlert, 15APR2013

An international team of researchers (Austria, USA, Germany) built one of the best sources for entangled photon pairs worldwide and employed highly efficient photon detectors designed by experts at NIST. These technological advances together with a suitable measurement protocol enabled the researchers to detect entangled photons with unprecedented efficiency. In a nutshell: "Our photons can no longer duck out of being measured," says Zeilinger (Austria). TECHNICAL ARTICLE

Tags: Quantum science

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S&T POLICY

Putin unveils \$50 bn drive for Russian space supremacy

PhysOrg.com, 14APR2013

President Vladimir Putin said that from 2013-2020, Russia would be spending 1.6 trillion rubles (\$51.8 billion, 38 million euros) on its space sector, a growth far greater than any other space power, including the construction of a brand new cosmodrome from where humans will fly to space by the end of the decade.

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

Abertay University develops method to take fingerprints from food

BBC News, 13APR2013

Recovering fingerprints from foodstuffs has proved problematic in the past because their surfaces vary in their colour and texture and porosity. A team of researchers in UK modified a substance known as Powder Suspension, a thick, tar-like material, and found that it produced a clear, high-quality mark on the smooth-surfaced food items such as onions, apples and tomatoes.

Tags: S&T policy, S&T UK

SCIENCE WITHOUT BORDERS

Hawaii land board approves Thirty Meter Telescope

R&D Magazine, 15APR2013

California and Canadian universities are planning to build the world's largest telescope at the summit of Hawaii's Mauna Kea volcano. The telescope would be able to observe planets that orbit stars other than the sun and enable astronomers to watch new planets and stars being formed. It should also help scientists see some 13 billion light years away for a glimpse into the early years of the universe.

Tags: Science without borders, Astronomy

Moore's Law and the Origin of Life

MIT Technology Review, 14APR2013

As life has evolved, its complexity has increased exponentially, just like Moore's law. Now geneticists have extrapolated this trend backwards and found that by this measure, life is older than the Earth itself.

Tags: Science without borders

Organic electronics will transform the way society interacts with new technology

Physics World, 14APR2013

Smartphones that can be folded to fit in your pocket and video displays that roll up and down like a window blind are the future of new technology, according to a joint report by the RSC and four other major chemical societies.

REPORT

Tags: Science without borders

SENSORS

Aircraft Sensors without Batteries or Cables

Alpha Galileo Foundation, 10APR2013

To monitor the health of an aircraft, EADS and Vienna University of Technology are developing a thermoelectric "Energy Harvesting Module" with just a few centimetres in outer diameter, which will supply enough energy to wireless sensor nodes. The artificial temperature difference created when the aircraft takes off and lands is sufficient to generate the required electrical energy. Initial tests of the system has been successful.

Tags: Sensors ■

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