



S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

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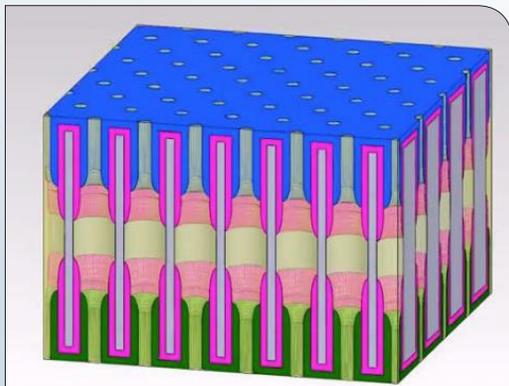
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FEATURE ARTICLES

[A billion holes can make a battery \(w/ video\)](#)

[Nanowerk, 10NOV2014](#)



A billion nanopores could fit on a postage stamp. (Image: NEES, a DOE Energy Frontier Research Center)

Researchers at the University of Maryland have invented a nanopore in a ceramic sheet that holds the electrolyte to carry the electrical charge between nanotube electrodes at either end. It can be fully

charged in 12 minutes, and recharged thousands of times. It could bring about the ultimate miniaturization of energy storage components. [TECHNICAL ARTICLE](#)

[Tags: Energy, Battery, Featured Article](#)

[Ghost illusion created in the lab](#)

[Science Daily, 06NOV2014](#)

Researchers in France were able to recreate the illusion of a presence that is felt but unseen in the laboratory and provide a simple explanation. They showed that the “feeling of a presence” actually results from an alteration of sensorimotor brain signals, which are involved in generating self-awareness by integrating information from our movements and our body’s position in space.

[Video, TECHNICAL ARTICLE](#)

[Tags: Neuroscience, S&T France, Featured Article](#)

[Direct brain interface between humans](#)

[Science Daily, 05NOV2014](#)

In a study which involved six people separated about half a mile apart from one another, researchers at the

University of Washington were able to transmit the signals from one person’s brain over the Internet and use these signals to control the hand motions of another person within a split second of sending that signal. They’re also exploring how to influence brain waves that correspond with alertness or sleepiness. The project could also eventually lead to “brain tutoring,” in which knowledge is transferred directly from the brain of a teacher to a student. [TECHNICAL ARTICLE](#)

[Tags: Neuroscience, Featured Article](#)

S&T NEWS ARTICLES

ADVANCED MATERIALS

[New materials yield record efficiency.. polymer solar cells](#)

[Science Daily, 10NOV2014](#)

An international team of researchers (USA, Hong Kong) has found that temperature-controlled aggregation in a family of new semi-conducting polymers is the key to creating highly efficient organic solar cells that can be mass produced more cheaply. Their findings also open the door to experimentation with different chemical mixtures that comprise the active layers of the cells.

[TECHNICAL ARTICLE](#)

[Tags: Advanced materials](#)

[On-demand conductivity for graphene.. nanoribbons](#)

[Nanowerk, 10NOV2014](#)

Researchers in Uzbekistan found that applying external driving force leads to enhancement of electronic transitions within valence and conduction bands in graphene nanoribbons. The finding demonstrates that such transitions allow a dramatic increase in conductivity within a short time, making it possible to tune the electronic properties using short external pulses. [TECHNICAL ARTICLE](#)

[Tags: Advanced materials, Materials science](#)

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New research lights the way to super-fast computers

Science Daily, 07NOV2014

Researchers in the UK found that by using ion doping they could change the electronic properties of amorphous chalcogenides that could use light to bring together different computing functions into one component, leading to all-optical systems. [TECHNICAL ARTICLE](#)

Tags: *Advanced materials, Communications Technology, S&T UK*

Clearing a path for electrons in polymers: closing in on the speed limits

Nanowerk, 06NOV2014

In the new polymer, identified by researchers in the UK, about 70% of the electrons are free to travel, whereas in conventional polymers that number can be less than 50%. The materials approach intrinsic disorder-free limits, which would enable faster, more efficient flexible electronics and displays. [TECHNICAL ARTICLE](#)

Tags: *Advanced materials, S&T UK*

Researchers fabricate a single-sheet graphene p-n junction with two top gates

Nanowerk, 06NOV2014

Researchers in Canada have designed and fabricated a single-sheet graphene p-n junction with two top gates. The standard technique, using a top and a bottom gate, can lead to damaging of the graphene layer. This is avoided in the new method, which also offers linear I-V characteristics at low gate voltage. The two-top-gate structure is expected to be a practical route to a room-temperature terahertz source. [TECHNICAL ARTICLE](#)

Tags: *Advanced materials, S&T Canada, Terahertz technology*

Thermomagnetic processing method provides path to new materials

Science Daily, 06NOV2014

Researchers from Oak Ridge National Laboratory and Washington University have developed a processing system that changes the microstructure and mechanical properties of liquid crystalline epoxy resin. It offers a potential path to new structural designs and functional composites with improved properties. [TECHNICAL ARTICLE](#)

Tags: *Advanced materials, Government S&T*

AUTONOMOUS SYSTEMS & ROBOTICS

Robot that moves like an inchworm could go places other robots can't

PhysOrg.com, 10NOV2014

To mimic the inchworm, researchers in South Korea used the soft, highly flexible silicone material PDMS for the robot's body. They built an inchworm mold using a 3D printer. Actuating longitudinal shape memory alloy wires in the robot's body with electric currents causes it to move

with a natural inchworm gait. The robots could be used in rescue and reconnaissance missions. [TECHNICAL ARTICLE](#)

Tags: *Autonomous systems & robotics*

Cockroach cyborgs use microphones to detect, trace sounds

Science Daily, 06NOV2014

Researchers at North Carolina State University have developed technology that allows cyborg cockroaches, or biobots, to pick up sounds with small microphones and seek out the source of the sound. The technology is designed to help emergency personnel find and rescue survivors in the aftermath of a disaster.

Tags: *Autonomous systems & robotics*

BIOTECHNOLOGY

Researchers develop printable plastic transistor capable of identifying what type of illness you're suffering from

PhysOrg.com, 07NOV2014

An international team of researchers (Spain, Germany) has engineered printable plastic transistors that can detect pathogens in blood or saliva. The transistor recognises the protein biomarkers of common diseases, switching on only when it has detected them. [TECHNICAL ARTICLE](#)

Tags: *Biotechnology, Sensors*

COMMUNICATIONS TECHNOLOGY

Lighter, cheaper radio wave device could transform telecommunications

PhysOrg.com, 10NOV2014

The new magnetic-free radio wave circulator developed by researchers at UT Austin has the potential to double the useful bandwidth in wireless communications by enabling full-duplex functionality. The device works by mimicking the way magnetic materials break the symmetry in wave transmission between two points in space, a critical function that allows magnetic circulators to selectively route radio waves. It could be used in cellphones and other wireless devices. [TECHNICAL ARTICLE](#)

Tags: *Communications Technology*

How Intelligent Machines Could Take Over the GSM Network

MIT Technology Review, 07NOV2014

As GSM has been superseded by 3G and 4G networks policymakers are considering switching off the GSM network and finding other uses for the radio frequencies allocated to it. An international team of researchers says that the GSM system should become a dedicated network for intelligent machines to communicate with each other. They have calculated the capacity of such a network and how it could become the communications backbone of a new generation of smart meters. [TECHNICAL ARTICLE](#)

Tags: *Communications Technology*

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“The greatest danger in modern technology isn’t that machines will begin to think like people, but that people will begin to think like machines.” ANONYMOUS

Boeing claims new anti-jam capability

Defense Systems, 06NOV2014

The anti-jamming communications technology could be used as either a satellite-based networking hub or as a ground-based communications terminal. It is based on a secure tactical waveform that is shielded from interference. Incorporating the technology into existing terminals and satellites would also help reduce operational costs.

Tags: Communications Technology

ENERGY

Artificial Photosynthesis: Creating fuel from sunlight

PhysOrg.com, 10NOV2014

Researchers in Australia have created a photo-catalyst based on copper oxide, the surface of which is decorated with tiny carbon dots of about 2 nano-metres in size. This nano-composite material can directly convert carbon dioxide dissolved in water to methanol using only sunlight as the energy source. [TECHNICAL ARTICLE](#)

Tags: Energy, S&T Australia

New technique for generating electricity

Science Daily, 10NOV2014

Researchers in Finland have successfully generated energy by utilizing the charging phenomenon that occurs naturally between two bodies with different work functions. Unlike piezoelectric and electrostatic devices the new technique does not require an integrated battery, electrets or piezo materials. [TECHNICAL ARTICLE](#)

Tags: Energy, S&T Finland

Taiwanese Researchers Report Progress Towards a Magnesium-ion Battery

IEEE Spectrum, 07NOV2014

Researchers in Taiwan have developed a technique to control the reduction-oxidation effects by magnesium membrane electrodes to increase the magnesium battery’s stability. It has a capacity 8 to 12 times higher than a lithium battery. In addition, its charge-discharge efficiency is 5 times higher. They are working to develop a set of prototypes to vet them against each other and select a working combination.

Tags: Energy, Battery

How to make mobile batteries last longer by controlling energy flows at nano-level

Nanowerk, 06NOV2014

Researchers in Germany discovered universal properties about the way energy efficiency of nano-systems fluctuates. Using this knowledge, energy controls could be achieved by a regulator which would prevent the natural process whereby heat generated in one part of a device is lost as it spreads to cooler areas. This theoretical understanding of how to regulate energy flows brings to life “Maxwell’s demon.” [TECHNICAL ARTICLE 1, 2](#)

Tags: Energy, Battery, S&T Germany

Nanotechnology research leads to car powered by its own body panels

Nanowerk, 06NOV2014

Researchers in Australia have developed lightweight “supercapacitors” which can be made into thin and extremely strong film with a high power density. The film could be embedded in a car’s body panels, roof, doors, bonnet and floor - storing enough energy to turbocharge an electric car’s battery in just a few minutes. [TECHNICAL ARTICLE 1, 2](#)

Tags: Energy, S&T Australia

Milestone in accelerating particles with plasma: Technique is powerful, efficient enough to drive future particle accelerators

Science Daily, 05NOV2014

Researchers at DOE/SLAC National Accelerator Laboratory and UCLA have shown that a promising technique for accelerating electrons on waves of plasma is efficient enough to power a new generation of shorter, more economical accelerators. This could greatly expand their use in areas such as medicine, national security, industry and high-energy physics research. [TECHNICAL ARTICLE](#)

Tags: Energy, Particle physics

Novel Sodium-Conducting Material Could Improve Rechargeable Batteries

Technology Org, 05NOV2014

An international team of researchers (USA, Japan, Russia) has discovered a safe, inexpensive, sodium-based, complex metal hydride that significantly outperforms all others in its class. It is made of the three easily obtainable elements of sodium, boron and hydrogen. [TECHNICAL ARTICLE](#)

Tags: Energy, Battery

GOVERNMENT S&T

Wanted: Ideas for Transforming Planes into “Aircraft Carriers in the Sky”

DARPA News, 09NOV2014

DARPA has issued an RFI seeking technical, security and business insights addressing the feasibility and potential value of an ability to launch and recover multiple small unmanned air systems from one or more types of existing large manned aircraft, such as C-130 transport planes.

Tags: Government S&T

FEATURED RESOURCE

Directory of Open Access Journals (DOAJ)

Collection of 1,776,875 Articles from 10,067 Journals published in 136 countries. Scientific and scholarly journals in all fields are included.

IMAGING TECHNOLOGY

Images of a nearly invisible mouse

Science Daily, 06NOV2014

Researchers in Japan have developed a method that combines tissue decolorization and light-sheet fluorescent microscopy to take extremely detailed images of the interior of individual organs and even entire organisms. The work opens new possibilities for understanding the way life works by allowing scientists to make tissues and whole organisms transparent and then image them at extremely precise, single-cell resolution.

TECHNICAL ARTICLE

Tags: Imaging technology, S&T Japan

MATERIALS SCIENCE

New electron spin secrets revealed

Nanowerk, 10NOV2014

An international team of researchers (Norway, UK) has demonstrated that it is possible to directly generate an electric current in a magnetic material by rotating its magnetization. Electric current generation, called charge pumping, provides a source of very high frequency alternating electric current, and its magnitude and external magnetic field dependency can be used to detect magnetic information. TECHNICAL ARTICLE

Tags: Materials science, Microelectronics

Transitions between states of matter: It's more complicated, scientists find

Science Daily, 06NOV2014

Researchers at New York University examined the way that a phase change, specifically the melting of a solid, occurs at a microscopic level and discovered that the phase changes can follow multiple pathways, which is counter to what we've previously known. The disordered cluster grows from the outside in rather than from the inside out. Over time, these clusters grow and eventually become sufficiently large to cause the transition from solid to liquid.

TECHNICAL ARTICLE

Tags: Materials science

Jet-fueled electricity at room temperature: Fuel cell can run without high heat

Science Daily, 05NOV2014

Researchers at the University of Utah investigated Jet Propellant-8 that is used by the U.S. military in extreme conditions such as scorching deserts or subzero temperatures. They used JP-8 in an enzymatic fuel cell which uses JP-8 for fuel and enzymes as catalysts. These new fuel cells can be used to power portable electronics, off-grid power and sensors. TECHNICAL ARTICLE

Tags: Materials science

MICROELECTRONICS

Heat transfer sets the noise floor for ultrasensitive electronics

PhysOrg.com, 10NOV2014

Using a combination of computer simulations and real-world experiments, an international team of researchers (Sweden, Spain, USA) showed that at 20 kelvins, many phonon modes become deactivated, and the crystal has only low-energy phonons that don't have enough energy to carry away the heat. As a result, when the transistor heats up high-energy phonons become available again. This electronic noise could affect the functioning of instruments operating at very low temperatures. TECHNICAL ARTICLE

Tags: Microelectronics

NEUROSCIENCE

Controlling genes with your thoughts

Science Daily, 11NOV2014

An international team of researchers (Switzerland, France) has developed a novel gene regulation method that enables thought-specific brainwaves to control the conversion of genes into proteins (gene expression). The inspiration was a game that picks up brainwaves in order to guide a ball through an obstacle course. TECHNICAL ARTICLE

Tags: Neuroscience

Scientists have unlocked a state of child-like fast learning in the adult brain

Science Alert (Australia), 10NOV2014

Researchers at Stanford University have managed to unlock child-like plasticity in the adult brains of mice by interfering with a protein known as PirB (or LiltrB2 in humans). PirB is a receptor that, in both mice and humans, appears to stabilise neural connections. Humans have five different versions of the LiltrB2 protein and scientists will now have to work out which one of those to target in order to unlock similar benefits in our brains.

TECHNICAL ARTICLE

Tags: Neuroscience

QUANTUM SCIENCE

Universal Braess paradox in open quantum dots

arXiv, 28OCT2014

Researchers in Brazil present analytical and numerical results that demonstrate the presence of the Braess paradox in chaotic quantum dots. The paradox, originally perceived in classical networks, shows that the addition of more capacity to the network can suppress the current flow in the universal regime. TECHNICAL ARTICLE

Tags: Quantum science

SCIENCE WITHOUT BORDERS

New Light Shed on Dark Photons

American Physical Society Spotlight, 10NOV2014

Particle physics is playing the game with much less than a full deck of “cards” because of the apparent existence of dark matter and dark energy, which, respectively, constitute 25% and 70% of the Universe’s energy budget. The standard model only covers the remaining 5% that consists of ordinary matter. Several attempts have been made to extend the standard model, particularly into the realm of dark matter. Beyond its gravitational interactions, very little is known about dark matter except that it appears to be slow moving (or “cold”). TECHNICAL ARTICLE

ARTICLE

Tags: Science without borders

SENSORS

JY-26 – China's new counter stealth radar

Defense Update, 11NOV2014

China is unveiling new phased array radar iterating in the VHF/UHF waveband, designed for long range air surveillance and target acquisition role. It can detect targets presenting low radar cross section (stealth aircraft) at the decimetric, centimetre and millimetre wave bands. It also provides users the ability to increase the power transmitted at a certain location where a target presence is suspected, thus increasing the probability of detection of low-RCS targets.

Tags: Sensors, Military technology, S&T China

Researchers develop a simple but extremely sensitive magnetometer

PhysOrg.com, 05NOV2014

The kinetic inductance magnetometer, developed by researchers in Finland, makes use of the dependence of superconductors’ electrical properties on magnetic fields. The new magnetometer is based on a single patterned thin film. It can be fabricated in a single-phase process unlike SQUID sensors. The new magnetometer can replace conventional technology in applications such as neuro-imaging, mineral exploration and molecular diagnostics.

TECHNICAL ARTICLE

Tags: Sensors, S&T Finland ■

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