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S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

FEATURE ARTICLES

Device can theoretically trap a light 'bit' for an infinite amount of time

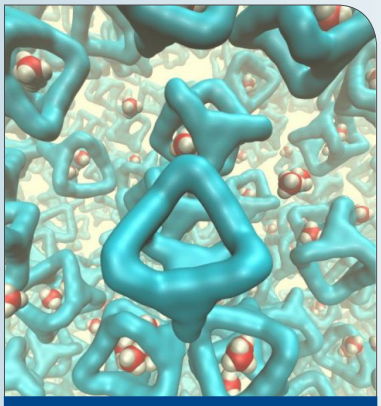
PhysOrg.com, 13NOV2015

Researchers in Portugal designed a nanoscale device that, under ideal conditions, can confine a "bit" of light with a single precise energy value for an infinite amount of time. Although a physically realized device would inevitably lose some of the trapped light due to material imperfections, the researchers expect that it should be possible to completely compensate for this loss by incorporating some form of optical gain like that used in lasers, so that in principle the lifetime can be infinitely large even in a real device. The most important application could be the design of an all-optical memory. TECHNICAL ARTICLE

Tags: Photonics, Featured Article

First 'porous liquid' invented

Science Daily, 11NOV2015



Researchers at Queen's University Belfast, Northern Ireland, UK, have made the world's first 'porous liquid' with potential application for carbon capture. Credit: Queen's University Belfast

An international team of researchers (UK, Argentina, Germany, France) have engineered a special liquid from the 'bottom-up' designing the shapes of the molecules which make up the liquid so that the liquid could not fill up all the space. Because of the empty holes, the liquid was able to dissolve unusually large amounts of gas. The project could pave the way for many more efficient and greener chemical processes, including carbon capture. TECHNICAL ARTICLE

Tags: Advanced materials, Materials science, Featured Article

S&T NEWS ARTICLES

ADVANCED MATERIALS

Pioneering research boosts graphene revolution

Science Daily, 16NOV2015

An international team of researchers (UK, Spain) has used a new technique to trap light at the surface of the wonder material graphene using only pulses of laser light. They have also been able to steer this trapped light across the surface of the graphene, without the need for any nanoscale devices. This dual breakthrough opens up a host of opportunities for advances in pivotal electronic products, such as sensors and miniaturised integrated circuits. TECHNICAL ARTICLE

Tags: Advanced materials, Sensors

New class of materials for organic electronics

Nanowerk, 12NOV2015

An international team of researchers (Germany, India) has precisely probed the processes occurring during light-induced charge separation in polymeric carbon nitrides. The most interesting result has been that charges are basically only transported along one dimension during this process, perpendicular to the graphite-like layers. The material is not only non-toxic and cost-effective, it is extremely durable, chemically very stable and can withstand temperatures of up to about 500 °C. Components made of these kinds of compounds might therefore be employed in environments that are unsuitable for today's organic electronics. TECHNICAL ARTICLE

Tags: Advanced materials, Materials science

AUTONOMOUS SYSTEMS & ROBOTICS

FAA Will Test Drones' Ability to Steer Themselves Out of Trouble

MIT Technology Review, 13NOV2015

Drones will become widespread for everything from agriculture to package delivery. A series of flight tests scheduled to start soon will help determine whether

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and how the Federal Aviation Administration will let that dream come true in U.S. airspace. The flights are part of an FAA program intended to test how drones can operate safely beyond the line of sight of their pilots and deal with problems like encountering conventional, crewed aircraft.
Tags: Autonomous systems & robotics

Video Friday: Shape-Changing Interface, Robot Pro-Wrestling, and 3D-Printed Humanoid

IEEE Spectrum, 13NOV2015

This robot is designed to work in disaster scenarios like collapsed or contaminated buildings.
Tags: Autonomous systems & robotics

CYBER SECURITY

Six Potential Game-Changers in Cyber Security: Towards Priorities in Cyber Science and Engineering

arXiv, 02NOV2015

A team of researchers in the US (Army Research Laboratory, Pennsylvania State University) explores results of a recent workshop that postulated possible game-changers or disruptive changes that might occur in cyber security within the next 15 years. Game-changers may be useful in focusing attention of research communities on high-priority topics. They illustrate each of the game-changers examples of related current research, and then offer recommendations for advancement of cyber science and engineering with respect to each of the six game-changers. TECHNICAL ARTICLE
Tags: Cyber security

ENERGY

Lasers could rapidly make materials hotter than the Sun

PhysOrg.com, 13NOV2015

Researchers in the UK discovered that when a high-intensity laser is fired at a certain type of material, it will create an electrostatic shockwave that can heat ions directly. They found that if a material contains special combinations of ions, they will be accelerated by the shockwave at different speeds. This causes friction, which in turn causes them to rapidly heat. They found that the effect would be strongest in solids with two ion types, such as plastics. Their method could be relevant to new avenues of research in thermonuclear fusion energy, where scientists are seeking to replicate the Sun's ability to produce clean energy. TECHNICAL ARTICLE
Tags: Energy, Nuclear energy, S&T UK

Super environmentally friendly: the 'fool's gold battery'

PhysOrg.com, 13NOV2015

Researchers in Switzerland combined a magnesium anode with an electrolyte made of magnesium and sodium ions. Nanocrystals made of pyrite (crystalline iron sulfide) serve as the cathode. The sodium ions from the electrolyte migrate to the cathode during discharging. When the battery is recharged, the pyrite re-releases the sodium ions. The magnesium as the anode is far safer than highly flammable lithium. The test battery withstood 40 charging and discharging cycles without compromising its performance. TECHNICAL ARTICLE
Tags: Energy, Battery, S&T Switzerland

On the way to multiband solar cells

PhysOrg.com, 12NOV2015

While the solar spectrum covers a wide range of energies solar cells can only harness light of a single energy. Researchers at the Lawrence Berkeley National Laboratory have engineered an alloy solar cell and demonstrated that optical transitions do indeed occur in all three bands - valence-intermediate; intermediate-conducting; and conducting-valence. Proving that a single material can establish optical transitions across the solar spectrum is a critical step on the path to a competitive product.
Tags: Energy, Government S&T, Solar energy

How trillions of tiny solar panels could power the internet of things

PhysOrg.com, 10NOV2015

The internet of things will mean a trillion new "smart sensors" being installed around the world by 2020. An international team of researchers (UK, Denmark) has demonstrated that organic photovoltaics is more effective at capturing diffuse or slanting light as they can be molded onto 3-D surfaces. For the internet of things, these improvements are a game-changer. Few of those trillion sensors will be placed conveniently in the sunshine, facing upwards; far more will be in unusual locations where light only falls indirectly. Tiny organic solar cells will enable energy to be captured throughout the day, even indoors or when attached to clothes. TECHNICAL ARTICLE
Tags: Energy, Sensors

Rucksack may someday power Soldiers' gear

Army Research Laboratory, 04NOV2015

The Energy Harvesting Backpack designed by researchers at ARL is an assault pack which glides up and down when the soldier walks. The mechanical energy produced by the motion recharges the battery. The equipment is being tested.
Tags: Energy, Government S&T

ENVIRONMENTAL SCIENCE

Largest ensemble simulation of global weather using real-world data

Science Daily, 10NOV2015

Researchers in Japan ran 10,240 simulations of a model of the global atmosphere divided into 112-km sectors, and then used data assimilation and statistical methods to come up with a model closely fitting the real data for a

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"Innovation distinguishes between a leader and a follower."

STEVE JOBS

historical time period, between November 1 and November 8, 2011. One of the key findings is that faraway observations, several thousand kilometers in distance, may have an impact on the eventual state of the weather forecast. TECHNICAL ARTICLE

Tags: Environmental science, Climatology

INFORMATION TECHNOLOGY

A network of artificial neurons learns to use human language

Science Daily, 11NOV2015

An international team of researchers (Italy, UK) has developed a cognitive model called ANNABELL (Artificial Neural Network with Adaptive Behavior Exploited for Language Learning). It is made up of two million interconnected artificial neurons, able to learn to communicate using human language starting from a state of "tabula rasa," and only through communication with a human interlocutor. ANNABELL does not have pre-coded language knowledge; it learns only through communication with a human interlocutor, thanks to two fundamental mechanisms, which are also present in the biological brain: synaptic plasticity and neural gating. This research sheds light on the neural processes that underlie the development of language. TECHNICAL ARTICLE

Tags: Information technology, Artificial intelligence

Google Seeks to Influence AI Research by Giving Software Away

Bloomberg Business, 10NOV2015

The Alphabet Inc. is releasing a program called TensorFlow as freely available open-source software. It is based on the same internal system Google has spent several years developing to support its AI software and other mathematically complex programs. The release of TensorFlow means anyone can download and modify the development software that underpins RankBrain , the AI powering part of Google's search engine and new features such as its Smart Reply.

Tags: Information technology, Artificial intelligence

MATERIALS SCIENCE

Superconductor survives ultra-high magnetic field

Science Daily, 12NOV2015

An international team of researchers (The Netherlands, Hong Kong) discovered that transistors made of ultrathin layers molybdenum disulfide are not only superconducting at low temperatures but also stay superconducting in a high magnetic field. The technique could be used in the development of a future quantum computer. TECHNICAL ARTICLE

Tags: Materials science

NEUROSCIENCE

Single Artificial Neuron Taught to Recognize Hundreds of Patterns

MIT Technology Review, 12NOV2015

Artificial neurons, for example, generally have just a handful of synapses and entirely lack the dendrites and thousands of synapses that form along them. Researchers in the US have shown that thousands of synapses are crucial not just for recognizing patterns but for learning the sequence in which they appear. The new model should lead to some testable hypotheses about the nature of memory. TECHNICAL ARTICLE

Tags: Neuroscience

Army's MIND Lab able to decode brain waves

Army Research Laboratory, 05NOV2015

Mission Impact Through Neurotechnology Design (MIND) is used to decode brain signals. An analyst might have a large image to look for things of interest to him. The program cuts an image up into "chips," smaller sections of the larger image and presents them to the analyst. The computer would then measure the analyst's neural response to each chip viewed. Images identified by the analyst's mind as being of-interest would then be tagged for further inspection. The automated system could greatly reduce the amount of time it takes to process an image.

Tags: Neuroscience, Government S&T, Information technology

QUANTUM SCIENCE

Quantum computer coding in silicon now possible

Science Daily, 16NOV2015

An international team of researchers (Australia, Japan) conducted an experiment where the two quantum particles involved are an electron and the nucleus of a single phosphorus atom, placed inside a silicon microchip. These particles are, literally, on top of each other—the electron orbits around the nucleus. Therefore, there is no complication arising from the spookiness of action at a distance. It therefore demonstrates the ability to write a purely quantum version of computer code, using two quantum bits in a silicon microchip—a key plank in the quest superpowerful quantum computers of the future. TECHNICAL ARTICLE

Tags: Quantum science

New research extends classic quantum optics phenomenon

PhysOrg.com, 12NOV2015

Researchers in the UK have extended the theory of

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resonance fluorescence, a classic phenomenon in quantum optics, to 2D nanostructures that have novel light emission properties. The research has potential applications in photonics devices that are based on the optical properties of quantum wells. TECHNICAL ARTICLE

Tags: Quantum science, S&T UK

Featured Resource

Digital Trends

Digital Trends helps their audiences make informed decisions that allow them to maximize the potential of technology and help integrate it into everyday life. RSS

'Spooky action at a distance' is really real

Science Daily, 12NOV2015

An international team of researchers (USA - NIST, University of Illinois at Urbana-Champaign, CalTech, Canada, Spain) created pairs of photons, and sent them to two different locations to be measured. They showed the measured results not only were correlated, but also—by eliminating all other known options—that these correlations cannot be caused by the locally controlled, "realistic" universe Einstein thought we lived in. This implies a different explanation such as entanglement. TECHNICAL ARTICLE

Tags: Quantum science

S&T POLICY

DFG to fund sixteen new research training groups

EurekAlert, 13NOV2015

The Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) is establishing 16 new Research Training Groups to further support early career researchers in Germany. They include four International Research Training Groups with partners in Australia, Canada, Japan and the USA. Topics range from key mechanisms of ageing to cultures of critique. They will receive funding of approximately 72 million euros for an initial period of four and a half years.

Tags: S&T policy, S&T Germany

UK's Quantum Hubs show future technology

EurekAlert, 13NOV2015

The £270 million UK National Quantum Technologies Programme was drawing the country's research base together with industry, research funding bodies and other government agencies to accelerate the transition of new technologies from the laboratory to industry. The Hubs have been formed by a consortium of 17 universities led by the universities of Birmingham, Glasgow, Oxford and York, funded by the Engineering and Physical Sciences Research Council. More information

Tags: S&T policy, S&T UK

Engineered bat virus stirs debate over risky research

Nature News, 12NOV2015

An international team of researchers (USA - University of North Carolina, Harvard University, China, Switzerland) created the backbone of a SARS virus that had been adapted to grow in mice and to mimic human disease. The chimaera infected human airway cells—proving that the surface protein of SHC014 has the necessary structure to bind to a key receptor on the cells and to infect them. This has triggered renewed debate over whether engineering lab variants of viruses with possible pandemic potential is worth the risks. TECHNICAL ARTICLE

Tags: S&T policy, Biology

The rise of do-it-yourself biology: A look at the Baltimore Underground Science Space

EurekAlert, 12NOV2015

A documentary, "The Rise of Do-It-Yourself Biology: A Look at the Baltimore Underground Science Space (BUGSS)" explores the work of BUGSS, a fast-growing community lab on the east side of Baltimore. BUGSS grew out of a group of interested students and professors at a local community college and now offers courses, lectures and the ability to experiment with biotechnology, from building microorganisms to modifying 3D printers. VIDEO

Tags: S&T policy, Biology, Synthetic biology

SCIENCE WITHOUT BORDERS

Thomson Reuters 2015 Top 100 global innovators

Thomson Reuters, 16NOV2015

Behind the scenes, Thomson Reuters carefully analyzed a huge amount of patent data, comparing volume and filing success with invention influence on a global scale. This granular approach allows them to objectively honor organizations that are dedicated to driving innovation. Full list of companies

Tags: Science without borders, Emerging technology

Simple Errors Limit Scientific Scrutiny

Science Newsline, 11NOV2015

Many peer-reviewed biological journals now require authors to publicly archive their data when a paper is published. A study by researchers in Australia suggests that many public datasets may be unusable due to missing data or essential information needed to interpret the data. TECHNICAL ARTICLE

Tags: Science without borders, S&T Australia

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New derivation of pi links quantum physics and pure math

Science Daily, 10NOV2015

In 1655 the English mathematician John Wallis published a book in which he derived a formula for pi as the product of an infinite series of ratios. Now researchers at the University of Rochester, in a surprise discovery, found the same formula in quantum mechanical calculations of the energy levels of a hydrogen atom. It brings out a beautiful connection between physics and math. TECHNICAL ARTICLE

Tags: Science without borders, Mathematics

SENSORS

Chinese scientists develop tunable stealth material that can hide ships from radar

Digital Trends, 13NOV2015

Researchers in China used active frequency selecting surface which is an ultra-thin multi-layered material that is only 7.8mm thick. This new material is designed to defeat microwave radar at the UHF band level. With its thin profile, this type of material is applicable to fighter jets, defeating a practical limitation found in previous materials.

Tags: Sensors, Military technology, S&T China

Machine Vision Algorithm Learns to Recognize Hidden Facial Expressions

MIT Technology Review, 13NOV2015

Researchers in Finland have built and tested the first machine vision system capable of spotting and recognizing microexpressions and they say that it is already better than humans at the task. They devloped vast and accurate databases of videos showing microexpressions in realistic conditions to train them. The machine vision algorithm has learned to spot microexpressions with wide-ranging applications from law enforcement to psychological analysis. TECHNICAL ARTICLE

Tags: Sensors, Pattern recognition, S&T Finland

Researchers design and patent graphene biosensors

PhysOrg.com, 13NOV2015

An international team of researchers (Russia, Denmark) are proposing an alternative to existing sensor chips for biosensors based on surface plasmon resonance. Under certain conditions, the use of graphene or graphene oxide as a linking layer between metal film and a biological layer comprised of molecule targets is able to significantly improve the sensitivity of biodetection. The use of graphene increases the sensitivity of analyses conducted using SPR spectroscopy more than ten times, which will revolutionize the field of pharmaceutical biodetection. TECHNICAL ARTICLE

Tags: Sensors, Advanced materials

System Recognizes Objects Touched by User, Enabling Context-Aware Smartwatch Apps (w/ video)

Carnegie Mellon University, 09NOV2015

The technique, called EM-Sense, developed by a team of researchers in the US (Carnegie Mellon University, Disney Research) takes advantage of the body's natural electrical conductivity to detect whether a person is touching an electrical or electromechanical device and, based on the distinctive electromagnetic noise emitted by such devices, automatically identify the object. EM-Sense can make the IoT experience even richer by enabling people to get information or additional functionality simply by touching everyday objects.

Tags: Sensors ■

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