



S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

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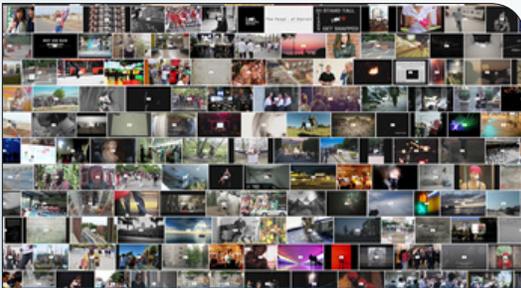
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FEATURE ARTICLES

[New algorithms locate where a video was filmed from its images and sounds](#)

[PhysOrg.com, 16FEB2015](#)



The system is capable of locating a few videos within a ten-kilometre radius of their actual geographical location. Credit: Flickr-VV.AA.

Researchers in Spain have developed a system based on recognition of images or frames and all of the audio. All

of the data obtained is merged together and grouped in clusters. Using their computer algorithms they can be compared with those of a large collection of recorded videos already geolocated around the world.

[TECHNICAL ARTICLE](#)

Tags: Big data, Featured Article

[Researchers demonstrate interaction between light and sound in nanoscale waveguide](#)

[Nanowerk, 16FEB2015](#)

Researchers in Belgium sculpted the environment of the nanoscale waveguide core to confine both light and sound. Trapped in that incredibly small area, the light and vibrations strongly influence each other: light generates sound and sound shifts the color of light stimulating Brillouin scattering. The scientists exploited this interaction to amplify specific colors of light. They anticipate this demonstration to open up new ways to manipulate optical information.

[TECHNICAL ARTICLE](#)

Tags: Photonics, Featured Article

ADVANCED MATERIALS

[A rapid extension of nanographene sheets from readily available hydrocarbons](#)

[Science Daily, 17FEB2015](#)

Researchers in Japan have developed a new catalytic one-shot annulative n-extension (APEX) reaction, which enables the rapid construction of nanographene in a single-step. They report the discovery of efficient sheet extending agents and a highly reactive palladium catalyst, making the APEX reaction highly applicable towards the 'growth from template' construction of a variety of nanographene structures as well as fine-tuning of their properties. [TECHNICAL ARTICLE](#)

Tags: Advanced materials, S&T Japan

[Novel crumpling method takes flat graphene from 2-D to 3-D](#)

[Science Daily, 17FEB2015](#)

Researchers at the University of Illinois developed a novel method for controlled crumpling of graphene and graphite via heat-induced contractile deformation of the underlying substrate. While graphene intrinsically exhibits tiny ripples in ambient conditions, they created large and tunable crumpled textures in a tailored and scalable fashion. The technique opens the doors to expanded capabilities for electronics and biomaterials.

[TECHNICAL ARTICLE](#)

Tags: Advanced materials

[Discovery of new ferroelectric silicate materials](#)

[Nanowerk, 16FEB2015](#)

Researchers in Japan have succeeded in fabricating single crystalline Bi_2SiO_5 . The origin of ferroelectricity of Bi_2SiO_5 was attributed to the twisting of the silicate tetrahedral chains. This new finding may trigger materials research of new ferroelectrics. [TECHNICAL ARTICLE](#)

Tags: Advanced materials, S&T Japan

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[Researchers synthesize material for efficient plasmonic devices in mid-infrared range](#)

PhysOrg.com, 16FEB2015

Researchers at North Carolina State University synthesized a material by doping cadmium oxide with a rare earth element called dysprosium. It effectively exhibits low-loss surface plasmon resonance in the mid-IR range. The new material could make solar harvesting technology more efficient by taking advantage of the mid-IR wavelengths of light, can lead to the development of more sophisticated molecular sensing technology, and more efficient opto-electronic devices. [TECHNICAL ARTICLE](#)

Tags: *Advanced materials, Materials science*

[The future of electronics—now in 2-D](#)

PhysOrg.com, 14FEB2015

At the AAAS meeting researchers at Ohio State University reported on a one-atom-thick sheet of germanane, a potential replacement for silicon. They found that by tuning the nature of atomic bonds, they could tune the electronic structure of the material and increase or decrease the energy it absorbs. Potentially they can make a material that traverses the entire electromagnetic spectrum, or absorbs different colors, depending on those bonds.

Tags: *Advanced materials*

[An unusual form of carbon ring structure identified in a family of doughnut-like macrostructures](#)

PhysOrg.com, 13FEB2015

Carbon nanotubes are made of hoop-like macrocycles called cycloparaphenylenes (CPPs), which themselves are formed by the interlinking of six-carbon benzene rings. A dication (2+) form of cycloparaphenylene consisting of eight benzene rings had previously been found to be unexpectedly stable, but the reason for this stability was unclear. Researchers in Japan have now discovered that the stability originates from aromatic stabilization. [TECHNICAL ARTICLE](#)

Tags: *Advanced materials, S&T Japan*

[Shape-memory polymer can repeatedly switch shapes without external forces](#)

Nanowerk, 13FEB2015

Researchers at the University of Rochester report that there is a new class of material which is like a shape-memory polymer because it can be switched between two different shapes. However, unlike other shape-memory polymers, the material does not need to be programmed each cycle upon cooling and heating. Upon cooling and heating it repeatedly switches shapes. The material may have applications in biotechnology, artificial muscles, and robotics. [TECHNICAL ARTICLE](#)

Tags: *Advanced materials*

[Silver-glass sandwich structure acts as inexpensive color filter](#)

Nanowerk, 13FEB2015

Researchers at Northwestern University created a three-layer design, where glass is wedged between two thin layers of silver film. The silver layers are thin enough to allow optical light to pass through, which then transmits a certain color through the glass and reflects the rest of the visible spectrum. By changing the thickness of the glass, they were able to filter and produce different colors. [TECHNICAL ARTICLE](#)

Tags: *Advanced materials, Materials science*

[Half-meter long carbon nanotube fibers for flexible electronics](#)

Nanowerk, 12FEB2015

Using a simple and direct hand-writing process, an international team of researchers (China, USA) has successfully produced ultralong polymer-carbon nanotube composite fibers with length of over 50 cm as precisely controlled conducting wires for flexible electronics. The fibers exhibit high electrical conductivity as well as superior mechanical flexibility. [TECHNICAL ARTICLE](#)

Tags: *Advanced materials*

AUTONOMOUS SYSTEMS & ROBOTICS

[Automating the Data Scientists](#)

MIT Technology Review, 13FEB2015

Researchers backed by Google are developing software that could automate some of the work performed by data scientists, in hopes of making sophisticated data skills more widely available. When fed raw data, the “automatic statistician” software spits out a report that uses words and charts to describe the mathematical trends it finds.

Tags: *Autonomous systems & robotics, Artificial intelligence*

[Video Friday: RoboCore, Anki Overdrive, Valkyrie's New Moves](#)

IEEE Spectrum, 13FEB2015

RoboCore is a dedicated controller board that has been designed from the ground up for robots. It is optimized for building and programming your own robots from scratch. You can plug all kinds of stuff into it, and it's easy to program while also providing wireless and cloud connectivity without having to muddle through all kinds of frustrating setup and configuration and customization.

Tags: *Autonomous systems & robotics*

BIG DATA

[Patterns in large data show how information travels](#)

Science Daily, 16FEB2015

According to researchers in Switzerland analysis of massive online data can reveal what information matters

“The method of science is tried and true. It is not perfect, it’s just the best we have. And to abandon it, with its skeptical protocols, is the pathway to a dark age.” CARL SAGAN

to us and with whom we have most in common. For example, networks can be used to study how information travels from one part of the world to another. By extracting patterns from raw datasets from social and economic interactions, it’s possible to analyse how information, diseases or financial crises can be spread in the networks.

Tags: Big data, S&T Switzerland

The Face Detection Algorithm Set To Revolutionise Image Search

MIT Technology Review, 16FEB2015

A team of researchers in the US (Stanford University, Yahoo) reveal a new approach to the image search that can spot faces at an angle, even when partially occluded. They capitalise on the advances made in a deep convolutional neural network. The idea is to train a many-layered neural network using a vast database of annotated examples, in this case pictures of faces from many angles. They say their new approach is simpler than others and yet achieves state-of-the-art performance. [TECHNICAL ARTICLE](#)

Tags: Big data, Pattern recognition

Training computers to understand sentiments conveyed by images

KurzweilAI, 12FEB2015

Researchers at the University of Rochester, in collaboration with industry, have developed a “progressive training deep convolutional neural network (CNN).” It is a more accurate way to train computers to be able to digest big data that comes in the form of images. This information could be useful for things as diverse as measuring economic indicators and predicting elections.

Tags: Big data, Artificial intelligence

COMMUNICATIONS TECHNOLOGY

Gigabits per second feat: Indoor optical wireless link explored

PhysOrg.com, 16FEB2015

Researchers in the UK describe an indoor optical bidirectional wireless link with an aggregate capacity over 100 Gb/s. The link operates over ~3 m range at 224 Gb/s (6 x 37.4 Gb/s) and 112 Gb/s (3 x 37.4 Gb/s) with a wide field of view of 60° and 36°, respectively. This is the first demonstration of a wireless link of this type with a FOV that offers practical room-scale coverage. [TECHNICAL ARTICLE](#)

Tags: Communications Technology, S&T UK

A Study of Future Communications Concepts and Technologies for the National Airspace System-Part III

NASA STI, 14FEB2015

NASA is investigating current and anticipated wireless communications concepts and technologies that the National Airspace System may need in the next 50 years. This paper will present progress made in the studies and describe the communications challenges and opportunities that have been identified as part of the study. “Part II”

Tags: Communications Technology, Government S&T, NASA

Li-Fi-like System Would Bring 100-Gbps Speeds Straight to Your Computer

IEEE Spectrum, 13FEB2015

Researchers in the UK report that one of the goals of the Ultra-Parallel Visible Light Communications project is to develop LiFi, which uses the light that is also illuminating a room as a way to send data signals. LiFi usually refers to schemes based on visible wavelengths of light, whereas this system relies on infrared light at 1550 nm, which is used in telecommunications. [TECHNICAL ARTICLE](#)

Tags: Communications Technology, S&T UK

ENVIRONMENTAL SCIENCE

Going negative with carbon

Science Daily, 14FEB2015

Researchers at Stanford University describe a promising technology called bioenergy with carbon capture and storage (BECCS) which can be used in power plants that generate electricity or factories that make chemicals and fuels. At a BECCS facility, grass and other vegetation is burnt along with coal or natural gas. The CO₂ emissions are captured and sequestered in the ground instead of going into the atmosphere, thus bypassing the decaying process. The result is a net-negative reduction in atmospheric CO₂.

[TECHNICAL ARTICLE](#)

Tags: Environmental science, Climatology

FORECASTING

Formula for predicting innovation

Science Daily, 14FEB2015

Researchers at Arizona State University have developed a set of mathematical techniques to detect the emergence of innovation in research. It’s a broad framework that pulls together concepts from graph theory, electrical engineering and applied mathematics to identify interesting patterns from large networks.

Tags: Forecasting, Big Data

INFORMATION TECHNOLOGY

UTSA and Silicon Informatics develop high performance computing software tools[EurekaAlert](#), 13FEB2015

Researchers at the University of Texas at San Antonio in collaboration with industry have developed the pseudo-random number generator (CPRNG) and the interstream correlation tester software (ISC Test). The tools have a variety of applications. They could be used in simulations by the military to determine enemy strategies or weapons testing. The finance industry could also benefit, implementing both tools to simulate future financial portfolios or stock options for retiring seniors.

Tags: Information Technology, Mathematics

FEATURED RESOURCE

Scientific Reports

Online and open access, Scientific Reports is a primary research publication from the publishers of Nature, covering all areas of the natural sciences. Scientific Reports are fast, rigorous, open, visible, interlinked and global. [RSS](#)

MATERIALS SCIENCE

Improved fire detection with new ultra-sensitive, ultraviolet light sensor[Science Daily](#), 17FEB2015

Researchers in the UK manipulated zinc oxide, producing nanowires from this readily available material to create an ultra-violet light detector which is 10,000 times more sensitive to UV light than a traditional zinc oxide detector. The new material could increase sensitivity and allow the sensor to detect distinct particles emitted at the early stages of fires, paving the way for specialist sensors that can be deployed in a number of applications. [TECHNICAL ARTICLE](#)

Tags: Materials science, S&T UK, Sensors

Insight into inner magnetic layers[Science Daily](#), 17FEB2015

An international team of researchers (France, Germany, Spain, USA) has observed how magnetic domains mutually influence one another at interfaces of spintronic components. They demonstrated that spin filters form between the outer ferromagnetic layers and the inner anti-ferromagnetic insulating layer, influencing tunnel magnetoresistance. Complex oxide heterostructures could play an important role in future spintronics. [TECHNICAL ARTICLE](#)

Tags: Materials science

Scientists go to great lengths to extend superlow friction[PhysOrg.com](#), 13FEB2015

Building on previous knowledge, an international team of researchers (Israel, Switzerland, Italy) theoretically investigated the maximum length of a chain of particles that exhibits superlubricity. Their model shows that this critical length depends on the experimental parameters and the material's properties, especially its stiffness. For very stiff materials, such as carbon nanotubes, superlubricity may hold for up to tens of centimeters, after which it abruptly disappears. [TECHNICAL ARTICLE](#)

Tags: Materials science

Step toward rational design of catalysts: Better catalysts, made-to-order[Science Daily](#), 12FEB2015

Researchers at the University of Utah captured enough data on the crucial steps in a reaction to accurately predict the structures of the most efficient catalysts, those that would speed the process with the least amount of unwanted byproducts. The new approach could help chemists design entirely new catalysts. [TECHNICAL ARTICLE](#)

Tags: Materials science

Weird 'strings' attached to future high temperature superconductivity[Science Daily](#), 12FEB2015

An international team of researchers (Germany, USA, Japan, the Netherlands) report that a seemingly unrelated area of physics, string theory, might give physicists a better understanding of the weird behavior of strongly correlated electron systems, such as high temperature superconductors. [TECHNICAL ARTICLE](#)

Tags: Materials science

New method to understand steel fracturing[Science Daily](#), 11FEB2015

Researchers in Spain studied Fe-C steel, a steel pre-alloyed with molybdenum and Distaloy AE, which is iron alloyed with diffusion with copper, nickel and molybdenum. The results have helped in understanding the connection between microstructure and the residual porosity. The methodology used is applicable to any type of alloy and not only to test its behavior under pressure, but also its behavior at high temperatures. [TECHNICAL ARTICLE](#)

Tags: Materials science

MICROELECTRONICS

Researchers test radiation-resistant spintronic material[PhysOrg.com](#), 17FEB2015

A team of researchers from the US (University of Michigan, Western Michigan University) exposed bulk Si-doped n-GaAs to proton radiation and measured the spin properties of n-GaAs as a function of radiation using

continued...

time-resolved Kerr rotation and photoluminescence spectroscopy. Results show that the spin lifetime and g-factor of bulk n-GaAs is largely unaffected by proton irradiation making it a candidate for further study for radiation-resistant spintronic devices. [TECHNICAL ARTICLE](#)

Tags: Microelectronics

PHOTONICS

[Nanophotonics and plasmonics: a great look for the International Year of Light](#)

[Nanotechweb](#), 13FEB2015

The journal, Nanotechnology is hosting a focus collection on nanophotonics that will be accepting and publishing papers throughout the year. The collection assembles results of research that continue to push the limits of our understanding and ability to control light interactions with nanomaterials, a topic that seems infinite in its scope for further investigation.

Tags: Photonics

[Nonlinear resonance disaster in the light of ultrashort pulses](#)

[Science Daily](#), 11FEB2015

Analyzing third-harmonic generation in titanium dioxide thin films, an international team of researchers (Germany, Finland, India) has demonstrated for the first time that conditions exist where optical harmonic generation becomes non-instantaneous. These findings have important consequences for femtosecond measurement techniques and possibly for ultrashort-pulse generation. [TECHNICAL ARTICLE](#)

Tags: Photonics

[Super vision](#)

[Nature News](#), 11FEB2015

It has been a desire, if not a dream for many throughout human history, to create a device that allows for seeing through walls (ala Superman), inside the human body or through a shield so that the enemy can be seen without risk. This article outlines research in this area and where it might be heading.

Tags: Photonics

QUANTUM SCIENCE

[Quantum random walk puts a limit on superposition](#)

[Physics World](#), 12FEB2015

There could be a fundamental boundary between the quantum and classical worlds. To try and nail down exactly where this boundary lies, researchers in Germany have tracked the motion of a large atom in an optical lattice. They found that the atom moves in a non-classical way, behaving as a quantum superposition that occupies more than one location at any given time. [TECHNICAL ARTICLE](#)

Tags: Quantum science, S&T Germany

SCIENCE WITHOUT BORDERS

[Possible discovery in 2015 of a new particle in physics](#)

[PhysOrg.com](#), 15FEB2015

The Large Hadron Collider which has undergone major upgrades this year will begin its second, three-year run. It will restart at a beam energy that is substantially higher, with the goal of better understanding why nature prefers matter to antimatter. Supersymmetry is an extension of the standard model of physics that aims to fill in some big gaps regarding how scientists understand matter.

Tags: Science without borders

SENSORS

[This Wireless Explosives Detector Is the Size of a Postage Stamp](#)

[Wired](#), 15FEB2015

In partnership with the Technical Support Working Group (TSWG), an inter-agency task force, GE Global Research is working on a new way to detect dangerous substances, one that costs about a nickel, can be deployed anywhere, and doesn't need human supervision. The device is a tiny RFID tag that activates only when it detects certain explosives or oxidizing agents. Researchers believe they can develop similar tags to detect biological matter like spores or bacteria. Commercialization could arrive as soon as the next few years.

Tags: Sensors

[Switching superconductivity by light](#)

[PhysOrg.com](#), 12FEB2015

Researchers in Japan fabricated a novel photo-switchable transistor by replacing the gate electrode in the conventional FET with a 'spiropyran'-thin-film. When a pale UV light was shone on the transistor it showed a rapid decrease of electrical resistance and turned into a superconducting state after 180 seconds. The research presents a novel concept which will drive innovation in the field of future high-speed switching devices or high-sensitivity optical sensors. [TECHNICAL ARTICLE](#)

Tags: Sensors, S&T Japan ■

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