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S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

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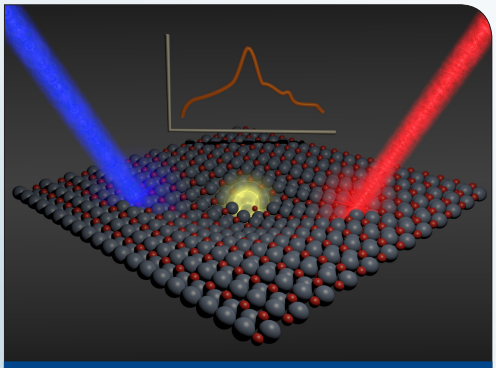
FEATURE ARTICLES

Pseudoparticles travel through photoactive material

PhysOrg.com, 23APR2015



Using the photoactive zinc oxide material, scientists studied the formation and migration of so-called polarons. Credit: Patrick Rinke/ Aalto University

An international team of researchers (Germany, Finland) has unveiled an important step in the conversion of light into storable energy. They studied the formation of polarons in zinc oxide. The pseudoparticles travel through the photoactive material until they are converted into electrical or chemical energy at an interface. TECHNICAL ARTICLE

Tags: Energy, Photonics, Featured Article

Researchers take a step towards development of optical single-phonon detector

PhysOrg.com, 23APR2015

An international team of researchers (USA, Austria) built a device based on a nanostructured semiconductor crystal which is used to scatter light directed at it by a laser. The scattered light is captured by a photon detector. By adding a filter between the device and the detector, the researchers were able to tune the frequency of the laser to allow only those photons through that did not match the frequency of the laser, each adjusted photon that passed though therefore represented one phonon, which the detector counted. TECHNICAL ARTICLE

Tags: Sensors, Photonics, Featured Article

S&T NEWS ARTICLES

ADVANCED MANUFACTURING

Australian researchers are using 4D printing to create self-folding objects

Science Alert, 23APR2015

The autonomous valve closes itself when it detects hot water. When armies are on the battlefield they leave a lot of electronics behind. What if you could make 3D printed electronics that after the soldiers leave undergo transient behaviour when they become too hot, or too cold, or too wet so they completely disappear and the enemy can't use any of your materials.

Tags: Advanced manufacturing, S&T Australia

Revolutionary discovery leads to invention of new 'building blocks'

Science Daily, 23APR2015

An international team of researchers (USA, Japan, China) designed and synthesized new polymer molecules called tetrahedrons. Through a reaction called "click chemistry," the tetrahedron building blocks can be precisely manipulated to unite with other tetrahedrons. This class of new hybrid materials could be custom designed for many functional materials including applications in nanotechnologies. TECHNICAL ARTICLE

Tags: Advanced manufacturing

ADVANCED MATERIALS

Bendable glass devices

MIT News, 24APR2015

Chalcogenide glasses are brittle, but researchers at MIT developed a way to embed very thin glass photonic devices such as flexible microdisk resonators and waveguides in alternating layers of soft and stiff polymers. Their flexible plastic device sustained being bent thousands of times in a fatigue test without failing. By changing composition, optical properties can be tuned without compromising the glass stability. TECHNICAL ARTICLE

Tags: Advanced materials

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BACK TO TOP

Synthesis of silicon oxides opens 'new world in a grain of sand'

Technology Org, 22APR2015

Researchers at the University of Georgia report two new compounds containing Si2O3 and Si2O4 cores that the team was able to isolate using the carbene stabilization technique. This synthetic strategy allowed the team to "tame" the highly reactive silicon oxide moieties at room temperature. The discovery breaks open an area of chemistry where difficulty with synthetics has limited the research activity. TECHNICAL ARTICLE

Tags: Advanced materials

AUTONOMOUS SYSTEMS & ROBOTICS

Video Friday: Sphero Droid, Drone Jogging, and Robot Feeds You Marshmallows

IEEE Spectrum, 24APR2015

WaterFly was one of the finalists for the Drones for Good competition. Developed at MIT's Senseable Cities Lab and the University of Toronto, the concept is to use a swarm of robots for water quality monitoring.

Tags: Autonomous systems & robotics

BIG DATA

Reducing big data using ideas from quantum theory makes it easier to interpret

Science Daily, 23APR2015

Analysing large volumes of data gathered by modern businesses and public services is problematic. Researchers in the UK borrow from quantum mechanics' well tested techniques for understanding the difference between two quantum states, and apply them to understanding which relationships in a system are similar enough to be considered redundant. This can drastically reduce the amount of information that has to be displayed and analysed separately and make it easier to understand. TECHNICAL ARTICLE

Tags: Big data, S&T UK

BIOTECHNOLOGY

A silver lining

EurekAlert, 23APR2015

Researchers at UC Santa Barbara positioned silver clusters at programmed sites on a DNA nanotube breadboard as a construction base for prototyping of photonics and electronics. They show that the breadboard keeps its shape when silver clusters are present. The overarching theme of the research is to understand how DNA controls the size and shape of the silver clusters themselves and then figure out how to use the fact that these silver clusters are stabilized by DNA in order to build nanoscale arrays.

Tags: Biotechnology

COMMUNICATIONS TECHNOLOGY

Novel polarization to increase data speeds

Science Daily, 23APR2015

Using special devices called "q-plates," researchers at the City College of New York manipulated a laser beam's polarization into novel shapes referred to as "radial" and "azimuthal." While the researchers used only four shapes, in principal, the number that can be used is unlimited. The amount of data that can be transmitted on a single laser beam can be scaled to terabits or even petabits. TECHNICAL ARTICLE

Tags: Communications Technology

CYBER SECURITY

Multi-million EU project to protect data against quantum computers

PhysOrg.com, 23APR2015

Researchers in the Netherlands are leading a research consortium consisting of eleven universities and companies to develop cryptology that resists the unmatched power of quantum computers. The project PQCRYPTO is funded by the European Commission under the H2020 program.

Tags: Cyber security, Quantum science, S&T EU, S&T Policy

NSFOCUS DDoS Threat Report Reveals IoT-Connected Devices Contributing to the Rise in SSDP-based Reflection Attacks

PR Newswire, 21APR2015

NSFOCUS released its bi-annual DDoS Threat Report revealing new attack findings and rising threats that organizations should be aware of throughout 2015. As the tide of distributed denial-of-service (DDoS) attacks continues to expand, the rise of the Internet of Things (IoT) and the influx of network connected devices, such as webcams and routers, are leading to the growth of Simple Service Discovery Protocol (SSDP)-based amplification attacks.

Tags: Cyber security

ENVIRONMENTAL SCIENCE

Perseverance paves way for wind laser

Technology Org, 25APR2015

ESA's Earth Explorer mission satellite will carry a novel wind lidar called Aladin—incorporating two powerful lasers, a large telescope and very sensitive receivers. The laser generates UV light which is beamed towards Earth. This light bounces off air molecules and small particles such as dust, ice and droplets of water in the atmosphere. The fraction of light that is scattered back towards the satellite is collected by Aladin's telescope and measured. It will offer much-needed information to improve weather forecasts.

Tags: Environmental science, Climatology, S&T EU

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"We can judge our progress by the courage of our questions and the depth of our answers." CARL SAGAN

IMAGING TECHNOLOGY

Generating broadband terahertz radiation from a microplasma in air

Science Daily, 24APR2015

Researchers at the University of Rochester have demonstrated that an approach for generating terahertz waves using intense laser pulses in air—first pioneered in 1993—can be done with much lower power lasers. The technique, which exploits the underlying physics to reduce the necessary laser power, could be improved for applications in the monitoring of explosives or drugs. TECHNICAL ARTICLE

Tags: Imaging technology, Sensors, Terahertz technology

INFORMATION TECHNOLOGY

Magnetic RAM makes synaptic-like junction

Nanotechweb, 24APR2015

According to researchers in France, a new class of magnetic memory known as spin-transfer torque magnetic random-access memory (STT-MRAM) could act as a memristive device and be used to make a synaptic-like junction capable of "learning". The junction might be useful as a memory element in integrated circuits and next-generation computers that mimic how the human brain works. TECHNICAL ARTICLE

Tags: Information Technology, S&T France

New techniques for eye-gaze tracking could change computer interaction

PhysOrg.com, 24APR2015

Researchers in the UK provided two major enhancements to a standalone gaze-tracking system. First, sophisticated software interprets factors such as velocity, acceleration and bearing to provide a prediction of the user's intended target. Next, a second mode of input is employed, such as a joystick. Potential applications include assistive technology for people with impairment, military aviation, and automotive environments. TECHNICAL ARTICLE

Tags: Information Technology, S&T UK

MATERIALS SCIENCE

Direct visualization of magnetoelectric domains

Science Daily, 24APR2015

A team of US and international researchers (Rutgers University, Cornell University, the Netherlands) has developed a novel microscopy technique called magneto-electric force microscopy (MeFM) to detect the local cross-coupling between magnetic and electric dipoles. Combined experimental observation and theoretical modeling provide understanding on how a bulk linear magneto-electric effect can be realized in a new family of materials. TECHNICAL ARTICLE 1, 2, 3

Tags: Materials science

Heat makes electrons spin in magnetic superconductors

Nanowerk, 24APR2015

An international team of researchers (Finland, Sweden, Spain) has shown how heat can be exploited for controlling magnetic properties of matter. The finding helps in the development of more efficient mass memories. TECHNICAL ARTICLE

Tags: Materials science

Nanobubbles dilemma solved after more than twenty years

Nanowerk, 21APR2015

According to an international team of researchers (the Netherlands, Australia) the reason nanobubbles survive for a long period of time lies in the pinning of the three phase contact line. Bubble shrinkage implies an increase of the radius of curvature and thus a smaller Laplace pressure. For stable bubbles the outflux originating from the Laplace pressure and the influx due to oversaturation balance. The result is a stable equilibrium. The knowledge can be used to make catalytic reactions more efficient. TECHNICAL ARTICLE

Tags: Materials science

NEUROSCIENCE

Spies exploring memory-extraction, says UCL neuroscientist

Wired, 24APR2015

Researchers in the UK have shown that it is possible to identify which specific memory people remember—even how old that memory is—based on a high-resolution MRI scan of the hippocampus. But that does not mean spies could identify memories without knowledge of what those memories already were—or that it's reliable enough to use in court.

Tags: Neuroscience, S&T UK

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PHOTONICS

Fast and accurate 3-D imaging technique to track optically-trapped particles

KAIST, 24APR2015

Researchers in South Korea have developed an optical diffraction tomography (ODT) technique to measure 3-D positions of optically-trapped particles in high speed. The technique has the advantage of measuring the 3-D positions and internal structures without labelling exogenous fluorescent agents and can be applied in various fields including physics, optics, nanotechnology, and medical science.

Tags: Photonics

Researchers build real-time tunable plasmon laser

PhysOrg.com, 24APR2015

To overcome the limitations of using solid material in plasmon lasers, a team of researchers in the US (Northwestern University, Duke University) used a gold array with a plasmonic nanocavity and a liquid dye solvent as the gain material. Doing so allows for changing the wavelength of the laser by changing the refractive index of the dye. TECHNICAL ARTICLE

Tags: Photonics

Featured Resource

ResearchSEA

ResearchSEA is Asia's research news portal, a one-stop centre where journalists and members of the public can gain access to news and local experts from the research world in Asia. RSS

QUANTUM SCIENCE

When mediated by superconductivity, light pushes matter million times more

PhysOrg.com, 28APR2015

Researchers in Finland placed a superconducting island between the electromagnetic field and the oscillator to mediate the interaction. With the superconducting island, the radiation pressure increased a millionfold the value previously achieved. In principle the strong coupling allows measurement of quantum information from an oscillator nearly visible to the naked eye. TECHNICAL ARTICLE

Tags: Quantum science, S&T Finland

Quantum 'paparazzi' film photons in the act of pairing up

Science Daily, 22APR2015

In the quantum world of light only those photons that are indistinguishable can wind up in a pair, through what is called Hong-Ou-Mandel interference. Researchers in Poland successfully imaged this subtle quantum effect for the first time. It is a very important result for quantum optics, as it means that from now on physicists will be able to directly observe spatial optical phenomena that involve single photons. TECHNICAL ARTICLE

Tags: Quantum science

S&T POLICY

New MIT report details benefits of investment in basic research

MIT News, 27APR2015

The report, The Future Postponed: Why Declining Investment in Basic Research Threatens a U.S. Innovation Deficit was prepared by a committee of MIT researchers and research administrators. Examining how funding cutbacks will affect the future of scientific studies in the U.S., the report highlights opportunities in basic research that could help shape and maintain U.S. economic power, and benefit society.

Tags: S&T policy

New Report Recommends Strategic Actions to Strengthen U.S. Optical and Infrared Astronomy System

National Research Council, 17APR2015

A new report from the National Research Council recommends improvements in observational, instrumentation, and data management capabilities as well as coordination among federal and private partners to better position the U.S. ground-based optical and infrared astronomy system to meet the long-term scientific goals outlined in the Research Council's recent decadal surveys on astronomy, astrophysics and planetary science.

Tags: S&T policy

SCIENCE WITHOUT BORDERS

New method provides direct SI traceability for sound pressure

PhysOrg.com, 28APR2015

Researchers in the UK have developed a new optical method for directly measuring sound pressure. The method can be used to determine the sensitivity of any acoustic device with direct traceability to length standards, and without assumptions regarding the geometry and sound field characteristics. Currently, the most accurate method for calibrating microphones is based on the principle of

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reciprocity—a theory first conceived by Lord Rayleigh nearly 150 years ago.

Tags: Science without borders, S&T UK

Bar graphs criticized for misrepresenting data

Nature News, 24APR2015

Dodgy data analysis has come under fire in recent months, and now an article in PLoS Biology1 takes aim at another staple of statistics. It argues that bar graphs used to describe a continuum of data are often uninformative and misleading, and should be purged from much of the scientific literature. TECHNICAL ARTICLE

Tags: Science without borders

Mechanical cloaks of invisibility—without complicated mathematics

PhysOrg.com, 23APR2015

A honeycomb is a very stable structure. Such stable types of known constructions might be useful in architecture or when developing new construction materials. Researchers in Germany have found a new principle that considerably facilitates the mathematical approach and produces promising results with simple means. TECHNICAL ARTICLE

Tags: Science without borders

SENSORS

Scientists create the sensation of invisibility

Science Daily, 23APR2015

Researchers in Sweden describe a perceptual illusion of having an invisible body. The experiment involves the participant standing up and wearing a set of head-mounted displays. The participant is then asked to look down at her body, but instead of her real body she sees empty space. TECHNICAL ARTICLE

Tags: Sensors, Imaging Technology, S&T Sweden

Taking quantum sensing to a new level

Science Daily, 23APR2015

Researchers at DOE's Oak Ridge National Laboratory used quantum correlated beams of light to overcome the fundamental detection limit of microcantilever-based sensors caused by intensity fluctuations. The new technique, which uses two beams of light to cancel noise, results in a 60 percent error reduction. The result enables higher contrast imaging and detection of lower concentrations of particles than are possible with conventional sensors.

Tags: Sensors, Government S&T, Quantum science

New tabletop detector "sees" single electrons

MIT News, 21APR2015

A team of researchers in the US (MIT, Pacific Northwest National Laboratory, the University of Washington, UCSB) reports that as radioactive gas decays and gives off electrons, the detector uses a magnet to trap them in a magnetic bottle. A radio antenna then picks up very weak signals emitted by the electrons, which can be used to map the electrons' precise activity over several milliseconds.

Tags: Sensors, Imaging Technology ■

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