Volume 4, Issue 11 ■ 14MAR2014

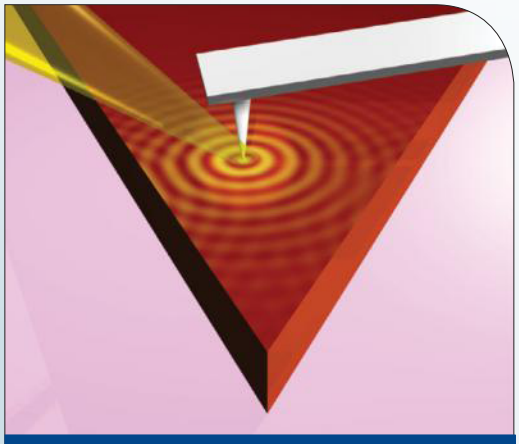
S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

FEATURE ARTICLES

Crystals ripple in response to light

EurekAlert, 06MAR2014



This image shows surface phonon polaritons launched by infrared light propagate across layers of hexagonal boron nitride, a van der Waals crystal.

Researchers at the University of California, San Diego, have shown that light can trigger coordinated, wave-like motions of atoms in atom-thin layers of crystal. The waves, called phonon polaritons, are far shorter than light waves and can be "tuned" to particular frequencies and amplitudes by varying the number of layers of crystal. These properties open the possibility of using polaritons to convey information in tight spaces, create images at far finer resolution than is possible with light, and manage the flow of heat in nanoscale devices. TECHNICAL ARTICLE

Tags: Communications Technology, Materials science, Featured Article

First step towards 'programmable materials': Sheet metal that never rattles

Science Daily, 05MAR2014

Researchers in Switzerland have succeeded in producing a prototype of a vibration-damping material that could change the world of mechanics forever. The material of the future is not only able to damp vibrations completely, it can also specifically conduct certain frequencies further. TECHNICAL ARTICLE

Tags: Advanced materials, S&T Switzerland, Featured Article

S&T NEWS ARTICLES

ADVANCED MANUFACTURING

Chinese Automaker Adopts New Efficient Engine Design

IEEE Spectrum, 05MAR2014

The engine developed by a company in China breaks with conventional designs in a number of ways to reduce weight and volume while saving fuel. It has two cylinders, which each house two pistons. This increases the power density as pistons need to travel half the distance. The two-stroke engine also uses electrical control systems in place of mechanical components to precisely regulate combustion.

Tags: Advanced manufacturing, S&T China

ADVANCED MATERIALS

Two-dimensional material shows promise for optoelectronics

MIT News, 10MAR2014

A team of MIT researchers has used a novel material that's just a few atoms thick to create devices that can harness or emit light. This proof-of-concept could lead to ultrathin, lightweight, and flexible photovoltaic cells, LEDs, and other optoelectronic devices, they say. TECHNICAL ARTICLE

Tags: Advanced materials

Atomically thin, flexible, semi-transparent solar cells created

Science Daily, 09MAR2014

There are materials other than graphene which exhibit remarkable properties if they are arranged in a single layer. Researachers in Austria have created ultrathin layers made of Tungsten and Selenium which could be used for photovoltaics. Experiments show that they may be used as flexible, semi-transparent solar cells. TECHNICAL ARTICLE

Tags: Advanced materials

Graphene oxide makes smart textiles

Nanotechweb, 06MAR2014

Researchers in Australia and Ireland have developed a new type of strong and flexible yarn made from graphene oxide

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that could be ideal in "smart" wearable textiles. The yarn has the highest ever capacitance reported to date for such a graphene-based structure. TECHNICAL ARTICLE

Tags: Advanced materials, S&T Australia

Nanoengineering team increases power efficiency for future computer processors

Nanowerk, 06MAR2014

Researchers at UCLA have demonstrated that using an emerging class of magnetic materials called "multiferroics," to generate spin waves could reduce wasted heat and therefore increase power efficiency for processing by up to 1,000 times. TECHNICAL ARTICLE

Tags: Advanced materials

Solar paint

Nanowerk, 05MAR2014

Working with semiconductor nanoparticles synthesized in solution, researchers are creating 'solar paints' that can be applied to virtually any structure, similar to regular paint. Researchers at the University of Notre Dame have developed a paste of cadmium sulfide-coated titanium dioxide nanoparticles that could turn large surfaces into solar cells. TECHNICAL ARTICLE

Tags: Advanced materials, Energy

AUTONOMOUS SYSTEMS & ROBOTICS

Video Friday: Ninja NAO, Robotic Refueling, and Too Many Legs

IEEE Spectrum, 07MAR2014

It's not an unstoppable swarm yet, but we're starting to get super excited for the release DASH Robotics' little insect bots.

Tags: Autonomous systems & robotics

New robotic refueling technologies tested

Science Daily, 05MAR2014

NASA has successfully concluded a remotely controlled test of new technologies that would empower future space robots to transfer hazardous oxidizer—a type of propellant—into the tanks of satellites in space today.

Tags: Autonomous systems & robotics, Government S&T

COMMUNICATIONS TECHNOLOGY

This rucksack contains a mobile network for disaster zones

Wired (UK), 26FEB2014

At the Mobile World Congress the Vodafone Foundation has unveiled its Instant Network Mini, an 11kg mobile phone network packed away into a rucksack that can be deployed in crisis and humanitarian situations. The rucksack has already been tested and is ready to be deployed in emergency situations.

Tags: Communications Technology

ENERGY

Promising news for solar fuels from Berkeley Lab researchers

PhysOrg.com, 07MAR2014

Researchers at the DOE's Lawrence Berkeley Laboratory show that a unique photocathode material they have developed for catalyzing the production of hydrogen fuel from sunlight has the potential to address one of the major challenges in the use of artificial photosynthesis to make renewable solar fuels.

Tags: Energy, Solar energy

ENVIRONMENTAL SCIENCE

Lasers to clean up space junk

Australian National University, 07MAR2014

Researchers in Australia would use lasers to find and track the space junk. The ultimate goal would be to zap the debris with lasers, slowing their orbits and allowing the space junk to fall back into the atmosphere, where it would burn up harmlessly.

Tags: Environmental science, Satellite technology, Space technology

Plasma plumes help shield Earth from damaging solar storms

Science Daily, 06MAR2014

Researchers from MIT and NASA observed a plume of low-energy plasma particles streaming from Earth's lower atmosphere up to the point, tens of thousands of kilometers above the surface, where the planet's magnetic field connects with that of the sun. In this region, called the "merging point," the presence of cold, dense plasma slows magnetic reconnection, blunting the sun's effects on Earth. TECHNICAL ARTICLE

Tags: Environmental science

INFORMATION TECHNOLOGY

MUSE Envisions Mining "Big Code" to Improve Software Reliability and Construction

USDA News, 06MAR2014

MUSE seeks to make significant advances in the way software is built, debugged, verified, maintained and understood. The collective knowledge gleaned from MUSE's efforts would facilitate new mechanisms for dramatically improving software correctness, and help develop radically different approaches for automatically constructing and repairing complex software. BAA Announcement

Tags: Information Technology, DARPA, Government S&T

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"It is the responsibility of scientists never to suppress knowledge, no matter how awkward that knowledge is." CARL SAGAN

Computer reads text written in the air and other innovations

Science Daily, 05MAR2014

The novel airwriting system developed by researchers in the Netherlands uses gestures as inputs and is suited in particular for mobile communication devices and wearable computing applications. TECHNICAL ARTICLE

Tags: Information Technology, Emerging technology

Copied from nature: Detecting software errors via genetic algorithms

Science Daily, 05MAR2014

Researchers in Germany have developed a software system called "XMLMATE" which generates test cases automatically and uses them to test the given program code automatically. Input from the program to be tested is fed the genetic algorithm on which the testing is based. It works similar to biological evolution, where the chromosomes are operating as the input.

Tags: Information Technology, S&T Germany

MATERIALS SCIENCE

Magnetically stimulated flow patterns offer strategy for heat transfer problems

Science Daily, 07MAR2014

Researchers at the DOE's Sandia National Laboratory discovered how to harness magnetic fields to create vigorous, organized fluid flows in particle suspensions. The heat transfer valve could potentially control the temperature of computer processors.

Tags: Materials science, Government S&T

Squeezing light into metals: Engineers control conductivity with inkjet printer

Science Daily, 07MAR2014

Using an inexpensive inkjet printer, researchers at the University of Utah produced microscopic structures that use light in metals to carry information. The new technique could be used to rapidly fabricate superfast components in electronic devices, make wireless technology faster or print magnetic materials. TECHNICAL ARTICLE

Tags: Materials science

The debut of the antihydrogen beam

PhysOrg.com, 07MAR2014

An international team of researchers has produced an antihydrogen beam by mixing antiprotons and positrons in a special alignment of magnetic and electric fields known as a cusp trap. The antihydrogen atoms escape the trap as a beam and can be detected 2.7 meters away. Lower-energy antihydrogen atoms will be needed, however, to measure hyperfine splitting. TECHNICAL ARTICLE

Tags: Materials science, Particle physics

Future electronics with super-efficient hard drives: Electricity controls magnetism

Science Daily, 06MAR2014

Researchers in Switzerland have demonstrated how a magnetic structure can be altered quickly in novel materials. The effect could be used in efficient hard drives of the future. TECHNICAL ARTICLE

Tags: Materials science, S&T Switzerland

Rough surface could keep small electronic parts from sticking together

Science Daily, 05MAR2014

Researchers in China report that rough zinc oxide coatings can prevent tiny silicon parts from adhering to each other. The study could accelerate the development of even more advanced, high-performance electronics and small sensors. TECHNICAL ARTICLE

Tags: Materials science, S&T China

Pulling polymers leads to new insights into their mechanical behavior

Science Daily, 04MAR2014

An international team of researchers (Switzerland, Germany, Spain, Austria) led by Switzerland, has pulled up isolated molecular chains from a gold surface using the tip of an atomic force microscope. The resolution is so high, that single atoms can be seen. TECHNICAL ARTICLE

Tags: Materials science

Tackling the tiniest technology to make gadgets smaller, faster and more efficient

Science Daily, 04MAR2014

Researchers at the University of Cincinnati are focusing on exciting collective oscillations of plasmons, and directing light through nanometer-thin metal films. The result could empower integrated circuits or facilitate a super-lens with seven times the strength of a standard microscope, opening further research into fields such as studying microorganisms and viruses.

Tags: Materials science, Imaging Technology

MICROELECTRONICS

Synthetic biologists shine light on genetic circuit analysis

Science Daily, 10MAR2014

In a significant advance for the growing field of synthetic biology, researchers at Rice University have created a

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toolkit of genes and hardware that uses colored lights and engineered bacteria to bring both mathematical predictability and cut-and-paste simplicity to the world of genetic circuit design. TECHNICAL ARTICLE

Tags: Microelectronics, Synthetic biology

NEUROSCIENCE

Ever-so-slight delay improves decision-making accuracy

Science Daily, 07MAR2014

A study by researchers at Columbia University could further our understanding of neuropsychiatric conditions characterized by abnormalities in cognitive function and lead to new training strategies to improve decision-making in high-stake environments. TECHNICAL ARTICLE

Tags: Neuroscience

Did That Just Happen? How Your Brain Alters Mental Timelines

Live Science, 06MAR2014

In a study researchers at New York University show a link between activity patterns in the hippocampus—a region known to be involved in forming memories—and how near or far away in time people placed their memories. TECHNICAL ARTICLE

Tags: Neuroscience

Featured Resource

Nature Web Feeds

Nature provides its latest table of contents as an RSS web feed, so you can get the world's best science delivered straight to your desktop.

PHOTONICS

Sensor turns faintest radio waves into laser signals

Nature News, 05MAR2014

Researchers in Sweden have found a way to detect faint radio waves and convert them directly into signals that can be transmitted by fibre optics. The discovery could improve the sensitivity of detectors used in magnetic resonance imaging and radio astronomy, and help to connect future quantum computers into a network.

Tags: Photonics, S&T Sweden

QUANTUM SCIENCE

Seeking quantum-ness: D-Wave chip passes rigorous tests

Science Daily, 05MAR2014

A key task for researchers has been to determine whether D-Wave processors operate as hoped—using the special laws of quantum mechanics to offer potentially higher-speed processing, instead of operating in a classical, traditional way. Now researchers at the University of Southern California show that the D-Wave quantum processor passes tests indicating that it uses special laws of quantum mechanics to operate. TECHNICAL ARTICLE

Tags: Quantum science

Quantum effects: Patterns of interfering massive particles

Science Daily, 04MAR2014

Researchers in Spain have uncovered a counter-intuitive result whereby bosons do not behave as expected, they are overlapping, and not interfering, due to the combination of interference and so-called exchange interaction. The latter is a quantum mechanical effect that alters their symmetry when identical particles are exchanged. TECHNICAL ARTICLE

Tags: Quantum science

S&T POLICY

How Airships Are Set to Revolutionize Science

MIT Technology Review, 04MAR2014

Airships can patrol the upper atmosphere, monitoring the ground or peering at the stars for a fraction of a cost of satellites, according to a new report. These observatories could revolutionize the kind of data researchers are able to gather about the universe. AIRSHIPS: A New Horizon for Science

Tags: S&T policy, Sensors

SCIENCE WITHOUT BORDERS

A shocking diet: Researchers describe microbe that 'eats' electricity

Science Daily, 10MAR2014

Researchers at Harvard University have shown that the commonly found bacterium Rhodopseudomonas palustris can use natural conductivity to pull electrons from minerals located remotely in soil and sediment while remaining at the surface, where they absorb the sunlight needed to produce energy. Using genetic tools, researchers were also able to identify a gene that is critical to the ability to take up electrons. TECHNICAL ARTICLE

Tags: Science without borders, Biology

SENSORS

Compact, High-Power and Efficient Ultraviolet Laser for Bio/Chem Detection

DARPA News, 04MAR2014

DARPA's Laser UV Sources for Tactical Efficient Raman (LUSTER) program seeks proposals for compact, efficient and low-cost deep-UV lasers for highly deployable biological and chemical agent detection. The goal is to create a new class of UV lasers that are more than 300

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times smaller than current lasers and 10 times more efficient.

Tags: Sensors, Government S&T

V-shaped Microfluidic Channel Able to Detect Trace Amounts of Biological Substances

Asia Research News, 04MAR2014

The V-trench biosensor, developed by researchers in Japan, can detect target biological substances with high sensitivity using surface plasmon resonance field enhanced fluorescence (SPRF) to enhance light signals emitted from fluorescent tags attached to the target biological substances.

Tags: Sensors, S&T Japan ■

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