



S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

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FEATURE ARTICLES

[Big step taken to develop nuclear fusion power](#)

[Science Daily, 12JUN2012](#)

The University of Tennessee researchers have successfully developed a key technology in developing an experimental reactor that can demonstrate the feasibility of fusion energy for the power grid. They are a part of ITER, an international collaboration among USA, EU and five other nations. ITER is building a fusion reactor that aims to produce 10 times the amount of energy that it uses. The facility is now under construction near Cadarache, France, and will begin operations in 2020.

Tags: Energy, Nuclear energy, Featured Article

[New property of flames sparks advances in technology](#)

[e! Science News, 11JUN2012](#)

For the first time chemists at the University College of London have discovered a new property of flames, which allows researchers to control the flames reactions at a solid surface, and opens up a whole new field of chemical innovation. This finding has wide implications for future technology, for example in detection of chemicals in the air and in developing our understanding of the chemistry of lightning. It also opens up the possibility of being able to perform nitrogen oxide and carbon dioxide electrolysis at the source for the management of green house gases.

TECHNICAL ARTICLE

Tags: Breakthrough technology, Featured Article

[Scientists uncover evidence of impending tipping point for Earth](#)

[UC Brekeley, 06JUN2012](#)

A prestigious group of scientists from around the world is warning that population growth, widespread

destruction of natural ecosystems, and climate change may be driving Earth toward an irreversible change in the biosphere, a planet-wide tipping point that would have destructive consequences, absent adequate preparation and mitigation. [VIDEO](#), [TECHNICAL ARTICLE](#)

Tags: Environmental science, Featured Article

S&T NEWS ARTICLES

ADVANCED MATERIALS

[New spin on antifreeze: Researchers create ultra slippery anti-ice and anti-frost surfaces](#)

[Science Daily, 11JUN2012](#)

Researchers at Harvard University have developed a way to coat the metal with a rough material that the lubricant can adhere to. The coating can be finely sculpted to lock in the lubricant and can be applied over a large scale, on arbitrarily shaped metal surfaces. In addition, the coating is non-toxic and anti-corrosive.

Tags: Advanced materials

[Scientists create plastic that emits light when pulled](#)

[Nanowerk, 11JUN2012](#)

Scientists at TU Eindhoven (the Netherlands) for the first time succeeded in creating a plastic that emits light when pulled. It can emit red, yellow, blue and green light. They incorporated an additional element in the plastic molecules, a molecular ring called dioxetane. When the plastic is pulled hard enough, the ring breaks open and emits light.

Tags: Advanced materials



The plastic that emits light when pulled.

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Combining elements to create highly functional materials

RIKEN, 08JUN2012

In a world-first, Japanese researchers have successfully synthesized a compound with four silicon atoms connected in the form of a rhombus. This nonconventional form has the potential to exhibit excellent functions. It is expected to lead to innovations not only in basic chemistry but also electronics and energy conservation technology. The team is now working on synthesizing new iron compounds, aiming to create a powerful magnet which does not contain rare metals.

Tags: Advanced materials, Materials science

Physicists make an entirely new form of quantum matter

Nanowerk, 07JUN2012

Thus far, the result of the Stanford University researchers' efforts is a tiny ball of ultracold quantum dipolar fluid. But the researchers have reason to believe that the humble substance will exhibit the seemingly contradictory characteristics of both crystals and superfluids. This combination could lead to quantum liquid crystals, or quantum-mechanical versions of the liquid crystals that make up most electronic displays. Or it could yield a supersolid—a hypothetical state of matter that would, in theory at least, be a solid with superfluid characteristics. [TECHNICAL ARTICLE](#)

Tags: Advanced materials

Development of light-emitting film with sensitivity to airborne materials

Nanowerk, 06JUN2012

Researchers in Japan have developed a vapoluminescent polymer film which is capable of detecting acidic and alkaline gases. It was found that the polymer film displays switchable vapoluminescence triggered by acid-base vapors, in which light emission is extinguished by contact with acidic vapors, and then resumes on subsequent contact with an alkaline vapor. This invention may lead to light-emitting sensors that detect and identify substances in the air, and their application to displays.

Tags: Advanced materials

AUTONOMOUS SYSTEMS & ROBOTICS

The Uncanny Valley

IEEE Spectrum, 12JUN2012

More than 40 years ago, Masahiro Mori, a robotics professor in Japan, hypothesized that a person's response to a humanlike robot would abruptly shift from empathy to revulsion as it approached, but failed to attain, a lifelike appearance. In subsequent years it received almost no attention. More recently, however, the concept of the uncanny valley has rapidly attracted interest in robotics and other scientific circles as well as in popular culture. Some

researchers have explored its implications for human-robot interaction and computer-graphics animation, while others have investigated its biological and social roots.

Tags: Autonomous systems & robotics

Engineered robot interacts with live fish

e! Science News, 11JUN2012

A bioinspired robot has provided the first experimental evidence that live zebrafish can be influenced by engineered robots. Although the live zebrafish tended to prefer each other to the robot, when given the choice to spend time next to the robotic fish or an empty space, both the individual fish and shoal of fish preferred the robot.

Tags: Autonomous systems & robotics

Video Friday: Humanoid Goes Swimming, a Last Moment Robot, and R2D2 Sells You a Prius

IEEE Spectrum, 08JUN2012

A half scale humanoid swimmer takes on R2D2 as a car salesbot in this week's Video Friday.

Tags: Autonomous systems & robotics

BIOTECHNOLOGY

Advancing nanotechnology with protein building blocks

Foresight Institute, 11JUN2012

UCLA biochemists have designed specialized proteins that assemble themselves to form tiny molecular cages hundreds of times smaller than a single cell. The creation of these miniature structures may be the first step toward developing new methods of drug delivery or even designing artificial vaccines.

Tags: Biotechnology, Advanced materials

Researchers watch tiny living machines self-assemble

Science Daily, 11JUN2012

To understand how a protein goes from a linear chain to a unique assembled structure, we need to capture snapshots of its shape at each stage of assembly. The problem is that each step exists for a fleetingly short time. Researchers in Canada developed a strategy to monitor protein assembly by integrating fluorescent probes throughout the linear protein chain so that they could detect the structure of each stage of protein assembly, step by step to its final structure.

Tags: Biotechnology, Biology

Synthetic cells used to bioengineer new forms of silica

PhysOrg.com, 11JUN2012

Scientists do not fully understand how nature uses proteins to develop new materials and minerals, but learning more about the natural processes could lead to bioengineering methods such as the biological synthesis of solid-state materials for electronics applications. Now scientists at

“To raise new questions, new possibilities, to regard old problems from a new angle, requires creative imagination and marks real advance in science.” ALBERT EINSTEIN

the University of California, Santa Barbara have designed a synthetic biological platform to facilitate the study of these processes and genetically engineer new materials.

Tags: Biotechnology

Wires turn salt water into freshwater

[PhysOrg.com](#), 11JUN2012

Scientists from the Netherlands have shown how to transform brackish (moderately salty) water into potable freshwater using just a pair of wires and a small voltage that can be generated by a small solar cell. The simple technique has the potential to be more energy-efficient than other techniques because of the minimal amount of mixing between the treated and untreated water.

Tags: Biotechnology

DARPA Effort Targets Illness Faster, Safer and More Effectively

[DARPA News](#), 08JUN2012

More warfighters are hospitalized each year for infectious diseases than are wounded in combat ([report](#)). In Vivo Nanoplatforams for Therapeutics seeks revolutionary treatment methods to get sick warfighters back on their feet, fast. A solicitation posted today calls for development of nanoplatforams that treat a variety of diseases. Such nanoparticle therapeutic platforams could be rapidly modified to treat a broad range of diseases, but more importantly will be based on safe and effective technologies.

SOLICITATION

Tags: Biotechnology, DARPA, Government S&T, Medical technology

BREAKTHROUGH TECHNOLOGY

All the colors of a high-energy rainbow, in a tightly focused beam

[e! Science News](#), 11JUN2012

By focusing intense pulses of infrared light--each just a few optical cycles in duration--into a high-pressure gas cell, the researchers converted part of the original laser energy into a coherent super-continuum of light that extends well into the X-ray region of the spectrum.

Tags: Breakthrough technology

COMMUNICATIONS TECHNOLOGY

One Radio to Rule Them All

[MIT Technology Review](#), 13JUN2012

The device is the first that can operate from 100 megahertz to 7.5 gigahertz, meaning all the way from AM and FM bands though television and Wi-Fi and cellular frequencies. It can also sense available spectrum and switch

between frequencies within at 50 microseconds, and in some cases as little as one microsecond. It can handle 400 megabits per second of data—about eight times what a typical home Wi-Fi system can do.

Tags: Communications Technology

ENERGY

Photovoltaic Cells Tap Underwater Solar Energy

[NRL](#), 12JUN2012

Scientists at NRL are developing solar cells capable of producing sufficient power to operate electronic sensor systems underwater at depths of 9 meters. Even though the absolute intensity of solar radiation is lower underwater, the spectral content is narrow and thus lends itself to high conversion efficiency if the solar cell is well matched to the wavelength range. The filtered spectrum of the sun underwater is biased toward the blue/green portion of the spectrum and thus higher bandgap cells such as GaInP perform much better than conventional silicon cells.

Tags: Energy, Government S&T, NRL, Solar energy

FORECASTING

Scientists utilizing new funding to develop computers that help search out the new technologies

[EurekAlert](#), 11JUN2012

Scientists at Rensselaer Polytechnic Institute have begun work on a new IARPA project to develop computer systems that help quickly identify emerging ideas and capabilities in technology. The research is part of the IARPA Foresight and Understanding from Scientific Exposition program.

Tags: Forecasting, Emerging technology, IARPA

FOREIGN S&T

China's Jiaolong sub to attempt deepest manned-dive

[PhysOrg.com](#), 11JUN2012

A Chinese submersible is poised to attempt the country's deepest-ever manned dive. The Jiaolong craft has arrived at a designated area in the Pacific Ocean aboard a Chinese ship and is set to dive 7,000 metres (22,960 feet).

Tags: Foreign S&T, Military technology, S&T China

IMAGING TECHNOLOGY

New tuner could bring terahertz to the masses

[Physics World](#), 13JUN2012

Scientists at Cornell University in Ithaca, New York, have designed a new type of tunable frequency multiplier that

exploits a fundamentally different tuning methodology than previous devices. The team has built a CMOS-based terahertz source with an output power 10,000 times that its predecessors. The theory behind the device is based on the self-synchronization of coupled oscillators, which allows the circuit to produce an output frequency at a series of harmonics of a circuit's fundamental frequency.

TECHNICAL ARTICLE

Tags: Imaging technology, Terahertz technology

[Imaging the nanoworld: Physicists use ultrafast lasers to create first tabletop x-ray device](#)

[Science Daily](#), 11JUN2012

To avoid the need for a large energy source to power an X-ray laser, the CU-Boulder researchers have created a tabletop device that uses atoms in a gas to efficiently combine more than 5,000 low-energy mid-infrared laser photons to generate high-energy X-ray photon which paves the way for major advances in many fields including medicine, biology and nanotechnology development.

Tags: Imaging technology

users to search and analyse data from these sensors. The SMART engine will be able to answer high-level queries by automatically identifying cameras, microphones and other sensors that can contribute to the query, then synthesising results stemming from distributed sources in an intelligent way.

Tags: Information Technology, S&T EU

[Gesture and voice: the future of ultra-thin laptops](#)

[BBC News](#), 08JUN2012

Some have very unusual features indeed - screens that can be detached or reverse-folded to switch from the clam-shell laptop mode to a tablet, and displays that can slide closer to the user. Others come with an activation code that protects the laptop from being used if it is stolen.

Tags: Information Technology

MATERIALS SCIENCE

[Without a Scratch: New American Chemical Society Video on Self-healing Plastic](#)

[Science Newline](#), 12JUN2012

This development offers the promise of cell phones, laptops, cars and other products with self-repairing, longer-lasting surfaces. However it may be awhile before the self-healing technology is widely used in electronic goods. It will first be used in more durable, self-healing paints and coatings. [VIDEO](#)

Tags: Materials science

[Optical materials: Holey gold \[research\]](#)

[Asia Research News](#), 11JUN2012

A beam of light hitting metal can cause all of the electrons at the surface to oscillate in unison. If the light is within an appropriate narrow band of wavelengths, it gets absorbed by the surface and creates half-matter hybrid particles known as surface plasmon polaritons (SPPs). Researchers in Singapore show that these materials are not black at all when looked at up close; they are actually very colorful, they only appear black to us because we look at them from far away, where over a large area all the different colors have been absorbed.

Tags: Materials science

[Physicists discover mechanisms of wrinkle and crumple formation](#)

[e! Science News](#), 11JUN2012

How a featureless sheet develops a complex shape has long remained elusive. Now, the physicists at the University of Massachusetts report that they have identified a fundamental mechanism by which such complex patterns emerge spontaneously.

Tags: Materials science

FEATURED RESOURCE

[Chinese Academy of Sciences](#)

Established in 1949, CAS has 12 branch offices, 117 institutes with legal entity, more than 100 national key laboratories and national engineering research centers, and about 1,000 field stations throughout the country. Its staff surpassed 50,000. Links to many English language journals and contents are provided. Chinese articles have abstracts in English. [RSS](#)

INFORMATION TECHNOLOGY

[Google in a Quantum Network](#)

[Nature Scientific Reports](#), 12JUN2012

We introduce the characterization of a class of quantum PageRank algorithms in a scenario in which some kind of quantum network is realizable out of the current classical internet web. We have found an instance of this class of quantum protocols that outperforms its classical counterpart and may break the classical hierarchy of web pages depending on the topology of the web.

Tags: Information Technology, Big Data, Data processing

[Researchers developing new type of internet search engine](#)

[PhysOrg.com](#), 11JUN2012

The European-funded project, known as SMART (Search engine for Multimedia Environment geneRated content), aims to develop and implement a system to allow internet

[Steel-strength plastics: Durable plastic may replace metals](#)

Science Daily, 11JUN2012

Researchers in Israel have succeeded in developing a new catalyst for the polypropylene production process, ultimately producing the strongest version of the plastic that has been created to date. With their catalyst, the researchers have produced the most accurate or “regular” polypropylene ever made, reaching the highest melting point to date.

Tags: Materials science

[Theorem unifies superfluids and other weird materials](#)

e! Science News, 11JUN2012

Matter exhibits weird properties at very cold temperatures. University of California, Berkeley, physicists have discovered a commonality among these materials that can be used to predict or even design new materials that will exhibit unusual behavior. The theory applies equally to magnets, crystals, neutron stars and cosmic strings.

Tags: Materials science

[Armored caterpillar could inspire new body armor](#)

Science Daily, 07JUN2012

Military body armor and vehicle and aircraft frames could be transformed by incorporating the unique structure of the club-like arm of a crustacean. The club is a highly complex structure, composed of three specialized regions. The first region contains a high concentration of mineral. Further inside, highly organized and rotated layers of chitin (a complex sugar) fibers and finally the club is encapsulated on its sides by oriented chitin fibers, which wrap around the club. Potential applications in structural materials are widespread because the final product could be lighter weight and more impact resistant than existing products.

Tags: Materials science

MICROELECTRONICS

[Radiation-resistant circuits from mechanical parts](#)

e! Science News, 13JUN2012

University of Utah engineers designed microscopic mechanical devices that withstand intense radiation and heat. The new devices are “logic gates” that perform logical operations such as “and” or “not” and are a type of MEMS. Each gate takes the place of six to 14 switches made of conventional silicon electronics. MEMS logic gates are not degraded by ionizing radiation because they lack semiconducting channels.

Tags: Microelectronics, Ruggedized electronics

[New nanomaterials method for boosting computer speed and improving memory density](#)

Nanowerk, 09JUN2012

Argonne National Laboratory researchers showed that sequential infiltration synthesis (SIS) can actually eliminate pattern collapse, enabling the fabrication of materials that have patterns with higher aspect ratios. One of the biggest advantages of this new study is that we’ve shown the possibility of using SIS for photolithography.

Tags: Microelectronics, DOE, Government S&T

[ICECool to Crack Thermal Management Barrier, Enable Breakthrough Electronics](#)

DARPA News, 07JUN2012

DARPA solicitation seeks proposals to research and demonstrate the microfabrication and evaporative cooling techniques needed to implement embedded cooling. Proposals are sought for intrachip/interchip solutions that bring microchannels, micropores, etc. into the design and fabrication of chips. Interchip solutions for chip stacks are also sought. [BAA](#)

Tags: Microelectronics

[Teaching self-assembling structures a new trick](#)

MIT News, 07JUN2012

Researchers at MIT have found a new way of making complex three-dimensional structures using self-assembling polymer materials that form tiny wires and junctions. The work has the potential to usher in a new generation of microchips and other devices made up of submicroscopic features. A key enabling technology was the MIT lab’s capability, using electron-beam lithography, to make 10-nanometer-wide cylindrical posts with precisely controlled positioning. [VIDEO](#)

Tags: Microelectronics

QUANTUM SCIENCE

[A Quantum Constellation - Viewpoint](#)

American Institute of Physics, 11JUN2012

Majorana’s geometrical representation of quantum spin as points on a sphere offers an intuitive approach to understanding quantum systems with multiple components. The Italian physicist Ettore Majorana, who disappeared in 1938, is now widely recognized for inventing the notion of a fermionic particle, the Majorana fermion, which has the strange property of being its own antiparticle. What is perhaps less well known is that he also developed a natural and exact representation of a quantum spin.

Tags: Quantum science

[Breaking the limits of classical physics](#)

e! Science News, 11JUN2012

Researchers in Denmark have made a simple experiment that demonstrates that nature violates common sense—

the world is different than most people believe. The experiment illustrates that light does not behave according to the principles of classical physics, but that light has quantum mechanical properties. The new method could be used to study whether other systems behave quantum mechanically.

Tags: Quantum science

Quantum computers move closer to reality, thanks to highly enriched and highly purified silicon

Science Daily, 11JUN2012

Researchers at Oxford University and in Germany have found that their special silicon allows processes to take place and be observed in a solid state that scientists used to think required a near-perfect vacuum. And, using this ²⁸Si they have extended to three minutes—from a matter of seconds—the time in which scientists can manipulate, observe and measure the processes.

Tags: Quantum science

SCIENCE WITHOUT BORDERS

New Peer-Reviewed Journal on Big Data Launching in Fall 2012

Mary Ann Liebert Inc, 08JUN2012

Spanning a broad array of disciplines focusing on novel big data technologies, policies, and innovations, the Journal will bring together the community to address the challenges and discover new breakthroughs and trends living within this information. The Journal will be published in print and online. For more information contact Smohin@liebertpub.com

Tags: Science without borders, Bibliometrics

1 million billion billion billion billion billion billion: Number of undiscovered drugs

e! Science News, 06JUN2012

A new voyage into “chemical space”—occupied not by stars and planets but substances that could become useful in everyday life—has concluded that scientists have synthesized barely one tenth of 1 percent of the potential medicines that could be made. The ACS Chemical Neuroscience report estimates that the actual number of these so-called “small molecules” could be 1 novemdecillion (that’s 1 with 60 zeroes), 1 million billion billion billion billion billion billion, which is more than some estimates of the number of stars in the universe.

Tags: Science without borders

SENSORS

A ‘dirt cheap’ magnetic field sensor from ‘plastic paint’

e! Science News, 12JUN2012

University of Utah physicists developed an inexpensive, highly accurate magnetic field sensor. The new magnetic field sensor paint contains negatively charged electrons and positively charged “holes” that align their spins parallel or not parallel in the absence or presence of a magnetic field—but only if radio waves of a certain frequency also are applied to the semiconductor paint.

Tags: Sensors ■

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