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S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

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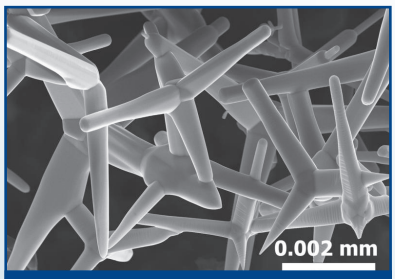

The tetrapods of the zinc oxide form an ideal basis for the robust material Aerographite. (Credit: TUHH)

World record: Lightest material in the world produced

Science Daily, 17JUL2012

Scientists in Germany have created a network of porous carbon tubes they call "Aerographite", that is three-dimensionally interwoven at nano and micro level. It weights only 0.2 milligrams per cubic centimetre, and is 75 times lighter than Styrofoam, but it is very strong nevertheless. TECHNICAL ARTICLE

Tags: Advanced materials, Featured Article

Disentangling information from photons

Science Daily, 16JUL2012

Theoretical physicists in the UK have found a new method of reliably assessing the information contained in photon pairs used for applications in cryptography and quantum computing. The findings are so robust that they enable access to the information even when the measurements on photon pairs are imperfect.

Tags: Quantum science, S&T UK, Featured Article

Our brains often fail to notice key words that can change the whole meaning of a sentence

Science Daily, 16JUL2012

After a plane crash, where should the survivors be buried? If you are considering where the most appropriate burial place should be, you are not alone say scientists in the UK. Far from processing every word we read or hear, our brains often do not even notice key words that can change the whole meaning of a sentence, according to new research. Analyses of brain activity also revealed that we are more likely to use this type of shallow processing under conditions of higher cognitive load—that is, when the task we are faced with is more difficult or when we are dealing with more than one task at a time.

Tags: Neuroscience, Featured Article

S&T News Articles

ADVANCED MATERIALS

Cleaning with sunlight

Nanowerk, 17JUL2012

When titanium dioxide molecules are 'activated' by the UV light in the sun's rays, they act as a kind of catalyst, triggering an electrochemical reaction which produces free radicals. These and other active molecules strike a fatal blow to bacteria, fungi and similar organisms. As a result, the organic substances are destroyed instead of remaining stuck to the surfaces incorporated with titanium dioxide. The next step is to develop new materials that can also be activated by artificial light.

Tags: Advanced materials

Japan and Vietnam join forces to exploit rare-earth elements

Nature News, 13JUL2012

In an effort to overcome China's near-monopoly on the supply of rare-earth elements, Japan and Vietnam have launched a joint research centre in Hanoi to improve extraction and processing of the materials.

Tags: Advanced materials

Smart materials get SMARTer

Harvard University, 11JUL2012

A Harvard-led team of engineers presented a strategy for building self-thermoregulating nanomaterials that can, in principle, be tailored to maintain a set pH, pressure, or just about any other desired parameter by meeting the environmental changes with a compensatory chemical feedback response.

Tags: Advanced materials

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AUTONOMOUS SYSTEMS & ROBOTICS

Autonomous robot maps ship hulls for mines

PhysOrg.com, 17JUL2012

Using algorithms developed by MIT, the robot is able to swim around a ship's hull and view complex structures such as propellers and shafts. The goal is to achieve a resolution fine enough to detect a 10-centimeter mine attached to the side of a ship.

Tags: Autonomous systems & robotics, Military technology

Drone developments accelerating

Drone Wars UK, 17JUL2012

UK MoD is setting up a new unmanned systems capability development centre (UASCDC). The new centre which will be run in conjunction with QinetiQ, aims to develop new drone programmes "from concept to deployment" as well as "facilitate engagement between industry and the MoD to make the best use of collective expertise and facilities." Farnborough Airshow will hold a new 'expo' on autonomous unmanned systems in July 2013.

Tags: Autonomous systems & robotics, S&T UK

Video Friday: Nao Boogies Down, Snakebots Climb Up, and Skippy Throws Rocks

IEEE Spectrum, 13JUL2012

Snakebots learn how to attack humans, and we've got video to prove it.

Tags: Autonomous systems & robotics

BIG DATA

Your Laptop Can Now Analyze Big Data

MIT Technology Review, 17JUL2012

The new software, called GraphChi, developed by Carnegie Mellon University, exploits the capacious hard drives that are becoming ever more common in personal computers. A graph would normally be stored in temporary memory (RAM) for analysis. With GraphChi, the hard drive performs this task instead.

Tags: Big data, Information technology

Big Data Analytics Trends: SAS CEO Jim Goodnight (w/video)

Information Week, 15JUL2012

Global business analytics software market grew 14.1% in 2011, and it's expected to keep growing nearly 10% per year through 2016. Why are companies spending more on analytics despite cutbacks elsewhere? In the video interview SAS CEO Jim Goodnight explains that influential books and articles helped ignite business-leader interest in making use of corporate data.

Tags: Big data

BIOTECHNOLOGY

Researchers develop 'nanorobot' that can be programmed to target different diseases

Nanowerk, 16JUL2012

University of Florida researchers have moved a step closer to treating diseases on a cellular level by creating a tiny particle that can be programmed to shut down the genetic production line that cranks out disease-related proteins. TECHNICAL ARTICLE

Tags: Biotechnology, Advanced materials

COMMUNICATIONS TECHNOLOGY

How To Steer Sound Using Light

MIT Technology Review, 16JUL2012

Zap an optical fibre with a couple of laser beams and the resulting interference pattern causes an interesting effect--it squeezes the material, an effect known as electrostriction. This creates a compression wave called a phonon, a packet of sound, which travels along the fibre. Controlling phonons would allow them to be steered away from sensitive areas. More ambitious still is the possibility of computing with phonons. TECHNICAL ARTICLE

Tags: Communications Technology

Unique properties of graphene lead to a new paradigm for low-power telecommunications

e! Science News, 15JUL2012

Reserarchers at Columbia University have shown that with the placement of a sheet of graphene just one-carbon-atom-thick, an originally passive device turns into an active one that generates microwave photonic signals and performs parametric wavelength conversion at telecommunication wavelengths.

Tags: Communications Technology

ENERGY

Weak light can now be used for applications as well

University of Groningen, 16JUL2012

Researchers in the Netherlands have found a way of 'harvesting' infrared light more efficiently. For this they use special molecules, which act as light antennae to capture the energy from weak infrared light. The antennae transmit the energy to the nanoparticles they are attached to. These particles subsequently convert two weak captured photons into a single strong, energy-rich photon, a process termed upconversion. TECHNICAL ARTICLE

Tags: Energy

continued...

"Only two things are infinite, the universe and human stupidity, and I'm not sure about the former." ALBERT EINSTEIN

Researchers 1 step closer to new kind of thermoelectric 'heat engine'

e! Science News, 11JUL2012

In spin Seebeck effect, the spin of electrons creates a current in magnetic materials, which is detected as a voltage in an adjacent metal. U.S. researchers report boosting the amount of voltage produced per degree of temperature change inside the semiconductor from a few microvolts to a few millivolts—a 1,000-fold increase in voltage, producing a 1-million-fold increase in power.

Tags: Energy, Materials science

United Kingdom Tops in Energy Efficiency, U.S. Lags in 9th Place

ACEEE, 11JUL2012

In a ranking of the world's 12 major economies by the American Council for an Energy-Efficient Economy (ACEEE), Germany comes in a close second, followed by Italy, Japan and France. United States and Canada lag behind in conserving power. REPORT, EFFICIENCY SCORECARD

Tags: Energy

ENVIRONMENTAL SCIENCE

Novel material used to capture carbon

EUROPA, 17JUL2012

A team of researchers in the UK have developed inter-locked metal organic framework called NOTT-202a that has unique carbon dioxide retention properties. It consists of tetra-carboxylate ligands, a structure made up of a series of molecules or ions bound to a central metal atom filled with indium metal centres. While other gases, such as nitrogen, methane and hydrogen, can pass through the structure, CO2 remains trapped in the material's nanopores, even at low temperatures.

Tags: Environmental science, S&T UK

Trial Balloon: A Tiny Geoengineering Experiment

New York Times, 17JUL2012

Researchers, James G. Anderson, a professor of atmospheric chemistry, and David W. Keith, whose field is applied physics, said the amounts involved would be so small that they would have no effect on climate—locally, regionally or globally. "This is an experiment that is completely nonintrusive," Dr. Anderson said. (His remarks contradicted a report in The Guardian that the experiment would involve spraying tens or hundreds of pounds of "sun-reflecting chemical particles into the atmosphere to artificially cool the planet.")

Tags: Environmental science

Climate models question the potential of geoengineering

Wired UK, 16JUL2012

Across all four models tested, IPCC researchers showed that geoengineering could lead to adverse effects on the Earth's climate, including a reduction in global rainfall. They therefore concluded that geoengineering could not be a substitute for the reduction of greenhouse gas emissions.

Tags: Environmental science

Scientists analyze potential of using lasers to make rain

PhysOrg.com, 16JUL2012

Researchers in Switzerland used a powerful laser to produce tiny water particles in moderately humid air. The water particles were just a few micrometers in diameter, too small to fall as rain droplets. However, the experiments demonstrated the ability to transform particles in a gas phase to a liquid phase through condensation, and larger droplets are expected to be feasible. TECHNICAL ARTICLE

Tags: Environmental science

GOVERNMENT S&T

Record-Breaking Laser Shot: National Ignition Facility Fires Off 192 Laser Beams Delivering More Than 500 Trillion Watts

Science Daily, 16JUL2012

Combining extreme levels of energy and peak power on a target in the NIF is a critical requirement for achieving one of physics' grand challenges—igniting hydrogen fusion fuel in the laboratory and producing more energy than that supplied to the target.

Tags: Government S&T, DOE, High energy laser

Video: Darpa's 'Wall-of-Sound' Fire Extinguisher

Wired UK, 15JUL2012

The premise of the research is that, since flames need a stable supply of cold plasma to persist, manipulating the flow of cold plasma could be the answer to more efficient fire extinguishing techniques. The Instant Fire Suppression project was specifically launched to devise new ways of tackling fires in enclosed spaces, such as aircraft cockpits and ship holds. VIDEO

Tags: Government S&T, DARPA

continued...

INFORMATION TECHNOLOGY

In search of the key word: Bursts of certain words within a text are what make them keywords

Science Daily, 17JUL2012

Researchers in Germany discovered that what denotes keywords is not the fact that they appear very frequently in a given text. It is that they are found in greater numbers only at certain points in the text. Their findings could be used in the future to improve Internet search engines, and they could also help to analyse texts and identify plagiarism.

Tags: Information Technology, Big Data, S&T Germany

Featured Resource

TechCast

They scan the literature and media, interview authorities, and draw on other sources to identify trends and background data on roughly 70 emerging technologies. Results are aggregated to forecast the most likely year each breakthrough will occur, the potential market size, and experts' confidence. Technologies are tracked as they pass through the typical life cycle. Technology articles

MATERIALS SCIENCE

New material breakthroughs for the printed and large area electronics industry

Nanowerk, 17JUL2012

New material breakthroughs for the printed and large area electronics industry will be one of the main topics at the Printed Electronics Asia event, which will take place on October 2-3 in Tokyo, Japan.

Tags: Materials science, Advanced materials

Particle trapped with light and heat

Physics World, 16JUL2012

Physicists in Germany have developed a trap for micron-sized particles that relies on both laser light and heat. The "optothermal" trap, which is built around a photonic crystal fibre, puts a new twist on microparticle trapping. The technique could offer a way to make precise measurements of the thermal forces acting on tiny particles and could even be used to sort and concentrate microparticles.

Tags: Materials science

Toughened silicon sponges may make tenacious batteries

PhysOrg.com, 16JUL2012

Researchers at Rice University reported that they've found a way to make multiple high-performance anodes from a single silicon wafer. The process uses simple silicon to replace graphite as an element in rechargeable lithium-ion batteries, laying the groundwork for longer-lasting, more powerful batteries for such applications as commercial electronics and electric vehicles. Because silicon expands as it absorbs lithium ions, the sponge-like configuration gives it room to grow internally without degrading the battery's performance.

Tags: Materials science, Energy

MICROELECTRONICS

Chips with self-assembling rectangles

Nanowerk, 17JUL2012

Researchers at MIT have developed a new approach to creating the complex array of wires and connections on microchips, using a system of self-assembling polymers. The work could eventually lead to a way of making more densely packed components on memory chips and other devices. TECHNICAL ARTICLE

Tags: Microelectronics

Funding boost for silicon carbide super chip

EurekAlert, 17JUL2012

Griffith University, Australia, is developing production processes for a silicon carbide microchip. The superior properties of silicon carbide enable smaller, more efficient, sensitive and robust devices that are able to operate in harsh chemical and temperature environments.

Tags: Microelectronics

Carbon-based transistors ramp up speed and memory for mobile devices

e! Science News, 16JUL2012

Working with carbon molecules called C60, researchers at the Tel Aviv University have built a sophisticated memory transistor that can both transfer and store energy, eliminating the need for a capacitor. This molecular memory transistor, which can be as small as one nanometer, stores and disseminates information at high speed—and it's ready to be produced at existing high-tech fabrication facilities.

Tags: Microelectronics

Chipping in—a deal to keep Moore's law alive

The Economist, 14JUL2012

Intel has invested €2.5 billion ($3.1 billion) in ASML, a Dutch company that dominates the market for the lithographic equipment that etches circuits onto silicon. €553m will go to technology to make chips on silicon wafers 450mm in diameter. Twice as many chips could be cut from these as from today's biggest wafers, which are 300mm across. The rest of the cash is for extreme ultraviolet (EUV) technology.

Tags: Microelectronics

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NEUROSCIENCE

In visual searches, computer is no match for the human brain

Science Daily, 17JUL2012

A large part of the human brain is dedicated to vision, with different parts involved in processing the many visual properties of the world. Some parts are stimulated by color, others by motion, yet others by shape. "What we're trying to really understand is what other mechanisms or strategies the brain has to make searches efficient and easy," said Eckstein, the lead researcher at UCal Santa Barbara.

Tags: Neuroscience, Information technology

QUANTUM SCIENCE

Long-distance relays for quantum data

Nanowerk, 11JUL2012

The present limit for photons is some 140 km, because of losses due to absorption on the way. Therefore some sort of "relay station" which is able to store quantum information is necessary. Researchers in Germany have now achieved a decisive breakthrough. They have managed to entangle two rubidium atoms held in optical traps 20 meters apart. Not only that, the system sends a signal which "announces" that entanglement has been achieved. TECHNICAL ARTICLE

Tags: Quantum science, Communications Technology

S&T POLICY

Free access to British scientific research within two years

The Guardian, 16JUL2012

The government is to unveil controversial plans to make publicly funded scientific research immediately available for anyone to read for free by 2014, in the most radical shakeup of academic publishing since the invention of the internet. Under the scheme, research papers that describe work paid for by the British taxpayer will be free online for universities, companies and individuals to use for any purpose, wherever they are in the world.

Tags: S&T policy, Science without borders

British Standards Institute launches four new nanotechnology standards

Nanowerk, 15JUL2012

As nanotechnologies begin to play an ever increasingly important role in commercial and consumer products, British Standards Institute (BSI) is working with experts in this field to promote acceptance and adoption of this technology and drive innovation.

Tags: S&T policy

SCIENCE WITHOUT BORDERS

Open access journals reaching the same scientific impact as subscription journals

Science Daily, 17JUL2012

A recent article compares the scientific impact of open access with traditional subscription publishing and has found that both of these publishing business models produce high quality peer reviewed articles.

Tags: Science without borders

SENSORS

New Notre Dame research raises questions about iris recognition systems

e! Science News, 15JUL2012

New findings by University of Notre Dame researchers indicate that iris biometric enrollment is susceptible to an aging process that causes recognition performance to degrade slowly over time.

Tags: Sensors, Biometrics

New tech for complex micro structures for use in sensors and other apps

Science Daily, 13JUL2012

Chemists in the U. S. have developed new materials and nanofabrication techniques for building miniaturized versions of components needed for medical diagnostics, sensors and other applications. These miniaturized components—many impossible to make with conventional techniques—would allow for rapid analysis at lower cost and with small sample volumes. TECHNICAL ARTICLE

Tags: Sensors, Materials science

ONR sensor and software suite hunts down more than 600 suspect boats

EurekAlert, 11JUL2012

A new sensor and software suite sponsored by the Office of Naval Research recently returned from West Africa after helping partner nations track and identify target vessels of interest as part of an international maritime security operation. The primary missions are aimed at assisting and building the host nation's capability to interdict and counter narcotics, human trafficking and illegal fishing.

Tags: Sensors, Government S&T, ONR

'Self-calibrating MEMS' bringing accuracy to nanotechnology

Nanowerk, 11JUL2012

Researchers at Perdue University have demonstrated tiny machines that could make possible super-accurate sensors and motors, with far-reaching applications from computer storage to altimeters, detecting petroleum deposits to measuring DNA-binding forces.

Tags: Sensors

STEM

National Science Board Concerned About U.S. Innovation Capacity

NSF News, 16JUL2012

Between 2008 and 2009, in the midst of the most recent recession, American businesses cut funding for research and development by nearly five percent, or $12 billion. The science board said these cuts coupled with government budget constraints at all levels are reasons for concern.

REPORT

Tags: STEM, R&D Funding

Research and Science Education Subcommittee Examines Challenges Faced by Research Universities

American Institute of Physics, 16JUL2012

The House Science Committee's Research and Science Education Subcommittee heard from representatives of the research university community in a June 27 hearing. Mo Brooks, Subcommittee Chairman, ended the hearing with the charge to scientists to come forward with information about specific regulations that Congress should be involved in, or not involved in, and which regulations should be repealed or reformed.

Tags: STEM

40% of degree-holders from China, India in 2020: OECD

PhysOrg.com, 11JUL2012

By contrast, the United States and the European Union countries are expected to account for just over a quarter of young people with tertiary degrees in OECD and G20 countries, the OECD said in a new education report.

REPORT

Tags: STEM ■

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