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S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

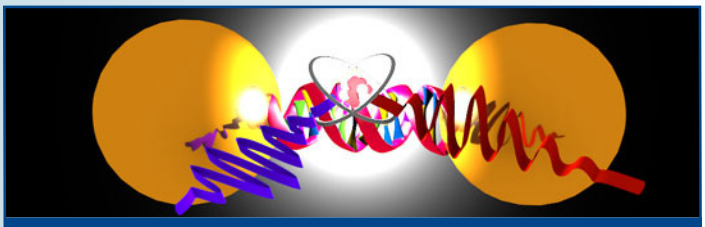
Feature Articles

DNA-templated nanoantenna captures and emits light one photon at a time

Nanowerk Spotlight, 31JUL2012

Researchers in France have developed new bottom-up techniques to make dimers of gold nanoparticles linked by a single DNA strand where the distance can be tuned at the nanometer scale. Through self-assembly, they grafted the gold nanoparticles and a fluorescent organic dye onto short synthetic DNA strands which are only 10-15 nm long. These nanostructures are the equivalent of a dipolar TV antenna (rabbit ear antenna) downscaled by a factor of 10 million.

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



Schematic representation of a nanoantenna formed of two gold nanoparticles linked by a DNA double strand and supplied by a single quantum emitter. (Image: Mickaël P. Busson, Brice Rolly, Brian Stout, Nicolas Bonod, Sébastien Bidault)

New dimension of physics research: Cutting the graphene cake

Science Daily, 31JUL2012

Researchers in the UK have demonstrated that graphene can be used as a building block to create new 3D crystal structures which are not confined by what nature can produce. Sandwiching individual graphene sheets between insulating layers in order to produce electrical devices with unique new properties could open up a new dimension of physics research.

TECHNICAL ARTICLE

Tags: Materials science, Breakthrough technology, S&T UK, Featured Article

A significant nanotechnology advance: Researcher measures the electrical charge of nanoparticles

Nanowerk, 30JUL2012

Researchers at the University of Zurich have developed a new method that measures not only the size of the particles but also their electrostatic charge. The new method even allows researchers to measure in real-time a change in the charge of a single entity. Changes in charge play a role in all bodily reactions, whether in proteins, large molecules such as the DNA double helix, where genetic make-up is encoded, or cell organelles.

TECHNICAL ARTICLE

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

S&T News Articles

ADVANCED MATERIALS

How to avoid traps in plastic electronics

Science Daily, 31JUL2012

Plastic semiconductors have an important flaw: the electronic current is influenced by "charge traps" in the material. A new study by a team of researchers from the University of Groningen and the Georgia Institute of Technology reveals a common mechanism underlying these traps and provides a theoretical framework to design trap-free plastic electronics. TECHNICAL ARTICLE

Tags: Advanced materials, Semiconductors

New coating evicts biofilms for good

Nanowerk, 31JUL2012

Using their recently developed technology, dubbed SLIPS (Slippery-Liquid-Infused Porous Surfaces), a team of Harvard scientists coated solid surfaces with an immobilized liquid film to trick the bacteria into thinking they had nowhere to attach and grow.

Tags: Advanced materials, Biotechnology

continued...

BACK TO TOP

Entropy can lead to order, paving the route to nanostructures

e! Science News, 27JUL2012

Left to their own devices, drifting particles find the arrangements with the highest entropy. That arrangement matches the idea that entropy is a disorder if the particles have enough space: they disperse, pointed in random directions. But crowded tightly, the particles began forming crystal structures like atoms do—even though they couldn't make bonds. These ordered crystals had to be the high-entropy arrangements, too.

Tags: Advanced materials

AUTONOMOUS SYSTEMS & ROBOTICS

First robot that mimics the water striders' jumping abilities

Science Daily, 31JUL2012

The first bio-inspired microrobot is capable of not just walking on water like the water strider—but continuously jumping up and down like a real water strider—now is a reality. Scientists have developed the agile microrobot which could use its jumping ability to avoid obstacles on reconnaissance or other missions. TECHNICAL ARTICLE

Tags: Autonomous systems & robotics

Robot Uses Its Tail To Land On Its Feet, Just Like A Cat

Wired Danger Room, 31JUL2012

Researchers at the University of Pennsylvania have found a way to gracefully circumvent a robot's embarrassing tendency to scrabble helplessly at the air, like a bug on its back, when it lands awkwardly. VIDEO

Tags: Autonomous systems & robotics

Video Friday: The CIA's Declassified Robotic Spy Critters

IEEE Spectrum, 27JUL2012

The CIA had an operational robotic dragonfly in the 1970s, and we have video of it flying.

Tags: Autonomous systems & robotics

BIG DATA

Leaders From Academia, Industry and Government Address Big Data, Workforce

NSF News, 26JUL2012

At the Joint Statistical Meetings—which begin in San Diego this weekend—a group of experts will address the implications of these changes. On July 31st the "Big Data: Research and Training Challenges" panel discussion, organized by NSF, will bring together leaders from academia, industry and government to talk about the challenges associated with the ever-increasing need to extract meaningful patterns from data.

Tags: Big data

BIOTECHNOLOGY

New class of synthetic vaccines explored

Science Daily, 31JUL2012

Researchers at Arizona University have developed the first vaccine complex that could be delivered safely and effectively by piggybacking onto self-assembled, three-dimensional DNA nanostructures. They envision applications where they could develop vaccines that require multiple components, or customize their targets to tailor the immune response.

Tags: Biotechnology

ENERGY

Breakthrough leads to record efficiency for next-generation solar cells

e! Science News, 29JUL2012

The solar cell represents a 37% increase in efficiency over the previous certified record. In order to improve efficiency, the researchers needed a way to both reduce the number of "traps" for electrons associated with poor surface quality while simultaneously ensuring their films were very dense to absorb as much light as possible. The solution was a so-called "hybrid passivation" scheme.

Tags: Energy, Solar energy

ENVIRONMENTAL SCIENCE

Scientists sound caution on geoengineering

EUROPA research, 01AUG2012

Led by the Max Planck Institute for Meteorology in Germany, researchers revealed how models of Earth in a warm, carbon dioxide (CO2)-rich world respond to an artificial reduction in the amount of sunlight reaching the planet's surface.

Tags: Environmental science

Urbanization contributed to Beijing storms

Nature News, 31JUL2012

Chinese government meteorologists say intense urban development might have exacerbated the violent rainstorm that hit Beijing on 21 July. An urban heat island tends to form when the natural landscape is replaced with materials such as concrete and asphalt. And pollution and heat generated by automobiles, air conditioning and industry exacerbates the effects. TECHNICAL ARTICLE

Tags: Environmental science

Global dispersion of bacterial cells on Asian dust

Nature Scientific Reports, 30JUL2012

Researchers in Japan demonstrated the presence of microbial cells on dust particles directly by bio-imaging. Bacterial abundance on dust particles declined from 105 to less than 103 cells/m3 as the dust event subsided.

continued...

"Technology feeds on itself. Technology makes more technology possible."

ALVIN TOFFLER

Their results confirm that bacteria can attach to aeolian dust particles and they have the potential to migrate globally during dust events and thus can contribute to the diversity of downwind ecosystems.
Tags: Environmental science

GOVERNMENT S&T

DARPA Clears Path for Advanced Communications Sensors

DARPA News, 31JUL2012

DARPA researchers have created the world's first solid state receiver to demonstrate gain at 0.85 THz. This is the latest breakthrough in the DARPA THz Electronics program in its quest for transistor-based electronics that will enable electronic capabilities at THz frequencies. This represents progress toward the second major technical milestone on the way to 1.03 THz integrated circuits.
Tags: Government S&T, DARPA

Foundation Building: DARPA Awards $15.3M in Basic Research Grants to Spur the Next Generation of Defense Innovators

DARPA News, 30JUL2012

This year DARPA welcomes 51 recipients, hailing from 18 states and 34 academic institutions, who will each apply $300,000 in grants over two years to a wide spectrum of basic research in areas spanning physical sciences, materials, mathematics and biology.
Tags: Government S&T, DARPA

INFORMATION TECHNOLOGY

Data visualization tool helps find the 'unknown unknowns'

R&D Magazine, 31JUL2012

The data analysis and visualization tool is a subset of the Test Matrix Tool (TMT), a multicomponent system developed by GTRI for designing, executing, and analyzing large-scale modeling and simulation data sets. The visualization capability offers a graphical user interface that provides both on-screen data-manipulation features like filters and the ability to see query results in the form of graphical images almost instantly.
Tags: Information Technology

Computational efficiency of current and near term CPUs and GPUs

Next Big Future, 28JUL2012

IBM's Blue Gene/Q conclusively demonstrates that a CPU designed for throughput can match and even exceed the power efficiency of GPUs. There is still a gap in terms of area efficiency, but smaller than the data suggests given that Blue Gene/Q includes a large cache and robust interconnects that are not found in a GPU.
Tags: Information Technology

MATERIALS SCIENCE

Wrinkled surfaces could have widespread applications

MIT News, 01AUG2012

The wrinkles on a raisin result from a simple effect: As the pulp inside dries, the skin grows stiff and buckles to accommodate its shrinking size. Now, a team of researchers at MIT has discovered a way to harness that same principle in a controlled and orderly way, creating wrinkled surfaces with precise sizes and patterns. This basic method, they say, could be harnessed for a wide variety of useful structures: microfluidic systems for biological research, sensing and diagnostics; new photonic devices that can control light waves; controllable adhesive surfaces; antireflective coatings; and antifouling surfaces that prevent microbial buildup.
Tags: Materials science

Terahertz radiation can induce insulator-to-metal change of state in some materials

Science Daily, 31JUL2012

A research team from MIT and Boston University achieved a first by demonstrating the use of THz light pulses to control the phase of a material. In this case, the researchers were able to change vanadium dioxide (VO2), from an insulating electronic state to a conducting electronic state. Findings have promising implications for development of terahertz semi-conductors and other applications.
TECHNICAL ARTICLE
Tags: Materials science, Terahertz technology

continued...

World's smallest semiconductor laser created

Science Daily, 31JUL2012

Physicists at the University of Texas at Austin, in collaboration with colleagues in Taiwan and China, have developed a nanolaser device that operates well below the 3-D diffraction limit. The device is constructed of a gallium nitride nanorod that is partially filled with indium gallium nitride. The nanorod is placed on top of a thin insulating layer of silicon that in turn covers a layer of silver film that is smooth at the atomic level.

Tags: Materials science, Breakthrough technology

Photovoltaics from any semiconductor

e! Science News, 27JUL2012

Technology developed by DOE and UC Berkeley requires only electrode and gate deposition, without the need for high-temperature chemical doping, ion implantation, or other expensive or damaging processes. The key to the success of this method is the minimal screening of the gate field which is achieved through geometric structuring of the top electrode. This makes it possible for electrical contact to and carrier modulation of the semiconductor be performed simultaneously.

Tags: Materials science, Energy, Solar energy

Featured Resource

Horizon Scanning Centre UK

Our goal is to support the use of evidence-based futures thinking in developing more innovative Government strategies and policies which are resilient to different future outcomes.

MICROELECTRONICS

First 'Mott Transistor' Offers Powerful New Type of Semiconductor

IEEE Spectrum, 27JUL2012

A team of Japanese researchers has built a new type of semiconductor that could drive down the lower limits on electronic component size and open up new avenues to fabricating low-power devices, persistent memories, and voltage-tunable optical switches. They have overcome electric field screening to obtain bulk phase changes from surface charge accumulation in a strongly correlated material.

Tags: Microelectronics

NEUROSCIENCE

Low-Power Chips to Model a Billion Neurons

IEEE Spectrum, 31JUL2012

Researchers in the UK are building the first low-power, large-scale digital model of the brain. Dubbed SpiNNaker, for Spiking Neural Network Architecture, their machine looks a lot like a conventional parallel computer, but it boasts some significant changes to the way chips communicate. "We expect it will let us model brain activity with speeds matching those of biological systems but with all the flexibility of a supercomputer."

Tags: Neuroscience

QUANTUM SCIENCE

10-year-old problem in theoretical computer science falls

MIT News, 31JUL2012

Researchers at MIT have shown that there are multiprover interactive proofs that hold up against entangled respondents. That answer is good news for cryptographers, but it's bad news for quantum physicists, because it proves that there's no easy way to devise experiments that illustrate the differences between classical and quantum physical systems. TECHNICAL ARTICLE

Tags: Quantum science

Self-Assembly of Quantum Dots with World's Highest Density 730 billion per square centimeter

Next Big Future, 31JUL2012

The NIMS Photonic Materials Unit (Japan) is developing an advanced self-assembly technique for semiconductor quantum dots called droplet epitaxy, which is an original NIMS technology. Recently they succeeded in the development of a new self-assembly technique for quantum dots with the world's highest surface density, greatly exceeding the previously reported value.

Tags: Quantum science

Qubits that never interact could exhibit past-future entanglement

PhysOrg.com, 30JUL2012

A team of researchers from the UK and Spain shows that it is possible in a real experiment to entangle two systems that neither interact with each other nor interact with a common resource at the same time, and without the need of measurements. It could become more than just an odd quantum property and potentially serve as a useful resource for quantum information applications.

Tags: Quantum science

continued...

Single-photon transmitter could enable new quantum devices

MIT News, 30JUL2012

A team of researchers at MIT and Harvard University has achieved a crucial long-term goal of producing quantum components for real-world devices: the ability to convert a laser beam into a stream of single photons in a controlled way. TECHNICAL ARTICLE

Tags: Quantum science

S&T POLICY

Research Infrastructures - New project factsheets

EUROPA, 31JUL2012

RIs may be 'single-sited', 'distributed', or 'virtual.' These key infrastructures have not only been responsible for some of the greatest scientific discoveries and technological developments, but are also influential in attracting the best researchers from around the world and in building bridges between national and research communities and scientific disciplines.

Tags: S&T policy, S&T EU

SCIENCE WITHOUT BORDERS

Camouflage of moths: Secrets to invisibility revealed

e! Science News, 31JUL2012

Moths are iconic examples of camouflage. Their wing coloration and patterns are shaped by natural selection to match the patterns of natural substrates, such as a tree bark or leaves, on which the moths rest. But, according to recent findings, the match in the appearance was not all in their invisibility. Researchers in Korea have found out that moths walk on the tree bark until they settle down to rest; the insects seem to actively search for a place and a body position that makes them practically invisible.

Tags: Science without borders

100 Years of Cosmic Rays Mystery

Science Daily, 30JUL2012

As physicists gather in early August to celebrate a century since the initial discovery of cosmic rays, Alan Watson, emeritus professor of physics at the University of Leeds, explains how physicists have gradually revealed the nature of these mysterious objects and examines the progress being made in understanding where they come from.

Tags: Science without borders

Mathematicians develop new method for describing extremely complicated shapes

e! Science News, 30JUL2012

Mathematicians at the Institute for Advanced Study in New Jersey "bridged" topology and fractals and made a discovery that could lead to a new way of describing extremely complicated shapes such as the configuration of the tiniest defects in a metal or even the froth of a breaking wave.

Tags: Science without borders

Thomson Reuters Spotlights Emerging Research Centers with the Addition of SciELO Database to Web of Knowledge

Newswise, 30JUL2012

The Intellectual Property & Science division of Thomson Reuters announced it has partnered with Scientific Electronic Library Online (SciELO) to host the SciELO database on Web of Knowledge(SM), the world's most powerful search and discovery platform.

Tags: Science without borders

SENSORS

New-generation sensor combines lasers and mechanics

R&D Magazine, 31JUL2012

Scientists at EPFL in Switzerland have developed a rapid, precise opto-mechanical measurement system that can be embedded into a silicon chip. The device is one of the most sensitive that can be operated at room temperature. This new technology could revolutionize the domain of sensors and atomic force microscopy.

Tags: Sensors

Electronic sensor rivals sensitivity of human skin

Nature News, 30JUL2012

Devices inspired by beetle wings could give robots a more nuanced sense of touch. Sheets of polymer fibres that are 100 nanometres in diameter and one micrometre long, and coated with metal to make them electrically conductive. When the sheets are sandwiched together, the nanohairs are attracted to one another and locked in, just like the beetle hairs. The device is then wired up so that an electrical current can be applied, and covered in a layer of soft, protective polymer.

Tags: Sensors

continued...

New Satellites Could Make GPS Harder to Jam

Wired Danger Room, 30JUL2012

GPS III, as it's known, is designed to improve the accuracy of the GPS signal and have better resistance to jamming. Also, it is meant to be compatible with its international alternatives like the European Galileo system or the Russian GLONASS system. Potentially, it will improve GPS' accuracy and resistance to jamming.

Tags: Sensors, Satellite technology

STEM

Science Across Virtual Institutes (SAVI)

NSF News, 31JUL2012

Science Across Virtual Institutes (SAVI) is a mechanism to foster interaction among scientists, engineers and educators around the globe. It is based on the knowledge that excellence in STEM research and education exists in many parts of the world, and that scientific advances can be accelerated by scientists and engineers working together across international borders.

Tags: STEM ■

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