



S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

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FEATURE ARTICLES

[Tiny particles swarm when blue light flashes](#)

[Futurity.org, 05FEB2013](#)

The work by researchers at New York University addresses a fundamental question in nature—what causes flocks and swarms to form and move in a particular way? They used colloids and discovered the basic organizing principles in natural flocking and how to use this to organize inorganic matter. The study offers the potential to enhance the design of a range of industrial products, including the architecture of electronics.

[TECHNICAL ARTICLE](#)

Tags: Breakthrough technology, Advanced manufacturing, Featured Article

[World's First Digital Laser Designed and Built in Africa](#)

[MIT Technology Review, 05FEB2013](#)

Instead of putting a spatial light modulator in front of the laser, researchers in Africa have built one into the device, where it acts as the mirror at one end of the cavity. In this way, the spatial light modulator shapes the beam as it is being amplified. [TECHNICAL ARTICLE](#)

Tags: Photonics, Featured Article

[Microchip moves information around in 3-D: From left to right, back to front, and up and down](#)

[Science Daily, 01FEB2013](#)

For the first time scientists in UK have created a new type of microchip which allows information to travel in three dimensions. Currently, microchips can

only pass digital information in a very limited way— from either left to right or front to back. [TECHNICAL ARTICLE](#)

Tags: Microelectronics, Breakthrough technology, S&T UK, Featured Article

S&T NEWS ARTICLES

ADVANCED MANUFACTURING

[Future Micro Factory](#)

[EU R&D News, 04FEB2013](#)

EU funded COTECH (Converging Technologies for Microsystems Manufacturing) concentrated and combined complementary techniques by converging technologies and developing hybrid solutions in the full process chain of micro production. It has shortened the time to market and reduced costs, evolving the vision of modular desktop or micro factories.

Tags: Advanced manufacturing, S&T Policy

[3-D printing breakthrough with human embryonic stem cells](#)

[Science Daily, 01FEB2013](#)

Researchers in Scotland used a valve-based printing technique, which was tailored to account for the sensitive and delicate properties of hESCs (human embryonic stem cells). The new method of printing may also pave the way for incorporating hESCs into artificially created organs and tissues ready for transplantation into patients suffering from a variety of diseases. [TECHNICAL ARTICLE](#)

Tags: Advanced manufacturing

[Discovery in synthetic biology takes us a step closer to new 'industrial revolution'](#)

[Science Daily, 01FEB2013](#)

Scientists from Imperial College London say their research brings them another step closer to a new kind of industrial revolution, where parts for these biological factories could be mass-produced. These factories have a wealth of applications including better drug delivery treatments for

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Scientists have created, for the first time, a new type of microchip which allows information to travel in three dimensions. Currently, microchips can only pass digital information in a very limited way— from either left to right or front to back. (Credit: LindenArtWork)

patients, enhancements in the way that minerals are mined from deep underground and advances in the production of biofuels. [TECHNICAL ARTICLE](#)

Tags: Advanced manufacturing, Biology, Synthetic biology

ADVANCED MATERIALS

[Organic Ferroelectric Molecule Shows Promise for Memory Chips, Sensors](#)

[Science Daily, 04FEB2013](#)

Researchers in the US and China discovered a molecule that shows promise as an organic alternative to today's silicon-based semiconductors. The findings display properties that make it well suited to a wide range of applications in memory, sensing and low-cost energy storage. [TECHNICAL ARTICLE](#)

Tags: Advanced materials

[Light-emitting nano triangles may have applications in optical technology](#)

[Science Daily, 05FEB2013](#)

For the first time, scientists have created single layers of a naturally occurring rare mineral called tungstenite, which they have used to produce a sheet of stacked sulfur and tungsten atoms with unusual photoluminescent properties and with potential for use in optical technologies such as light detectors and lasers. [TECHNICAL ARTICLE](#)

Tags: Advanced materials

[A possible answer for protection against chemical/biological agents, fuel leaks, and coffee stains](#)

[Science Daily, 01FEB2013](#)

Researchers at MIT have demonstrated surfaces that effectively perform as "chemical shields against virtually all liquids." To make this possible, surfaces are prepared using a nanoscale coating that is approximately 95 percent air, which in turn, repels liquids of any material in its class, causing them to literally bounce off the treated surface. [TECHNICAL ARTICLE](#)

Tags: Advanced materials, Materials science

[New genre of 'intelligent' micro- and nanomotors](#)

[Science Daily, 30JAN2013](#)

Enzymes, workhorse molecules of life that underpin almost every biological process, may have a new role as "intelligent" micro- and nanomotors with applications in medicine, engineering and other fields. According to researchers at U Penn, single molecules of common enzymes can generate enough force to cause movement in specific directions. [TECHNICAL ARTICLE](#)

Tags: Advanced materials

AUTONOMOUS SYSTEMS & ROBOTICS

[Video Friday: RoboCup Qualifiers, a Hulking Heavy-Lift Quadrotor, and SPHERES at Google](#)

[IEEE Spectrum, 01FEB2013](#)

Humanoids are not nearly as quick as those Mid Size robots.

Tags: Autonomous systems & robotics

BIOTECHNOLOGY

[Can you predict how a disease will spread in a population?](#)

[PhysOrg.com, 05FEB2013](#)

By quantifying the instances of transmission events an international team of researchers has determined the propagation speed of a pathogen based on the knowledge of the demography of a species, the way animals wander and the degree of contagiousness of the disease. New research has laid the foundation for a new generation of zoonotic disease spreading models, which could allow for more targeted prevention strategies.

Tags: Biotechnology, Biology

BREAKTHROUGH TECHNOLOGY

[Scientists propose creating Maxwell's demon with two quantum dots](#)

[PhysOrg.com, 04FEB2013](#)

In a new study researchers in Germany have proposed that Maxwell's demon can be physically implemented with two interacting quantum dots connected to thermal reservoirs, where one dot takes the role of the demon and the other that of the controlled system. The experiment doesn't violate the second law of thermodynamics, but it provides a very simple, minimalist implementation of the demon.

[TECHNICAL ARTICLE](#)

Tags: Breakthrough technology, Materials science

COMMUNICATIONS TECHNOLOGY

[Photonics: On track for downsizing](#)

[Science Daily, 04FEB2013](#)

Using plasmonic techniques, researchers in Singapore demonstrated optical resonator structures, which allow a beam of light to circulate in a closed path, that can be used as on-off switches for light. The researchers built their plasmonic resonator devices from two copper structures that guide light along a long wire adjacent to a circle. The smallest width of the copper circuit is only about 180 nanometers, which is much smaller than conventional light guides. [TECHNICAL ARTICLE](#)

Tags: Communications Technology, Photonics

“Science is simply common sense at its best, that is, rigidly accurate in observation, and merciless to fallacy in logic.” THOMAS HUXLEY

A breakthrough in organic spin electronics

Nanowerk, 01FEB2013

Using information stored in the spin of an electron, scientists in Germany succeeded in storing the information in an organic molecule and reading it at a temperature close to room temperature. [TECHNICAL ARTICLE](#)

Tags: Communications Technology

Slowing down microwaves in a chip

PhysOrg.com, 01FEB2013

Researchers in Switzerland have succeeded in capturing a microwave pulse within a chip for several milliseconds before releasing it with little loss. This extraordinary delay normally requires hundreds of miles of electrical cable, as well as amplifiers. For the moment, it only works at very low temperatures. But the principle could equally be used to develop devices that operate at room temperature.

Tags: Communications Technology

New data transfer protocol enabling 30 times improved transmissions speeds

PhysOrg.com, 31JAN2013

Fujitsu Laboratories announced the development of a new data transfer protocol that, by taking a software-only approach, can significantly improve the performance of file transfers, virtual desktops and other various communications applications.

Tags: Communications Technology, Information technology

ENERGY

New semiconductor research may extend integrated circuit battery life 10-fold

Science Daily, 01FEB2013

Researchers at the Rochester Institute of Technology have demonstrated that use of new methods and materials for building integrated circuits can reduce power—extending battery life to 10 times longer for mobile applications compared to conventional transistors.

Tags: Energy, Battery

Research unlocks mystery surrounding the harnessing of fusion energy

EurekaAlert, 31JAN2013

The research of a multi-institutional team from the US, Japan, and France, led by Purdue University has answered the question of how the behavior of plasma can be controlled with ultra-thin lithium films on graphite walls lining thermonuclear magnetic fusion devices. They found that the presence of oxygen in the surface plays a key role

in the bonding of deuterium, while lithium's main role is to bring oxygen to the surface.

Tags: Energy, Nuclear energy

Just Add Water: How Scientists Are Using Silicon to Produce Hydrogen On Demand

Science Daily, 22JAN2013

Researchers at the University of Buffalo created spherical silicon particles about 10 nanometers in diameter. When combined with water, these particles reacted to form silicic acid (a nontoxic byproduct) and hydrogen -- a potential source of energy for fuel cells. [TECHNICAL ARTICLE](#)

Tags: Energy, Materials science

ENVIRONMENTAL SCIENCE

Gases work with particles to promote cloud formation

Science Daily, 04FEB2013

Researchers at Columbia University and Georgia Institute of Technology show that certain gas phase compounds tend to stick on particles, making them 'soapier' and promoting their ability to form cloud droplets. This mechanism has not been considered in climate models before. [TECHNICAL ARTICLE](#)

Tags: Environmental science, Climatology

IMAGING TECHNOLOGY

New modeling approach transforms imaging technologies

Science Daily, 05FEB2013

Researchers at Perdue University are improving the performance of technologies ranging from medical CT scanners to digital cameras using a system of models to extract specific information from huge collections of data and then reconstructing images like a jigsaw puzzle. The new approach is called model-based iterative reconstruction, or MBIR.

Tags: Imaging technology, Information technology

Development of high-definition infrared color night-vision imaging technology

Advanced Industrial S&T (Japan), 03DEC2012

Researchers in Japan have developed 3CCD full high-definition (HD), infrared color night-vision imaging technology employing an infrared imaging technique using three charge-coupled-device (CCD) image sensors and an image-processing technique. The new technology makes it possible to record clear, high-frame-rate color videos even in darkness.

Tags: Imaging technology, S&T Japan

INFORMATION TECHNOLOGY

QinetiQ unveils Integrated Warrior System to meet need for single end-user device

Defense Systems, 04FEB2013

QinetiQ North America unveiled an integrated system designed to enable warfighters to manage multiple mission systems through a single end-user device. IWS is designed to increase situational awareness and improve access to critical mission resources by creating a personal area network for warfighters.

Tags: Information Technology, Military technology

Self-powered nanodevices that never need new batteries

Nanowerk, 04FEB2013

Researchers at Columbia University are attempting to build self-powered systems using nanoscale devices that can transmit and receive wireless signals using so little power that their batteries never need replacing. They rely on tiny bits of ambient solar energy to recharge themselves. Such energy efficiencies could dramatically cut down on the cost to operate a variety of these devices at once, while eliminating the need for maintenance.

Tags: Information Technology, Nanomaterials

Toward practical compressed sensing

MIT News, 01FEB2013

Compressed sensing extracts more information from a signal than the signal would appear to contain. It promises dramatic reductions in the cost and power consumption of a wide range of imaging and signal-processing applications. Researchers at MIT have developed a new mathematical framework for evaluating compressed-sensing schemes that factors in the real-world performance of hardware components.

Tags: Information Technology

FEATURED RESOURCE

SciCentral

Since 1997 SciCentral editors have been aggregating breaking research news from reputable and reliable sources. Only content freely accessible to online readers is considered.

MATERIALS SCIENCE

Dynamics and Thermodynamics beyond the critical point

Nature, 04FEB2013

The sound propagation in the Terahertz frequency region reveals a sharp dynamic crossover between the gas like and the liquid like regimes along several isotherms. Such a crossover allows one to determine a dynamic line in the phase diagram which exhibits a very tight correlation with a number of thermodynamic observables, showing that the supercritical state is remarkably more complex than thought so far. [TECHNICAL ARTICLE](#)

Tags: Materials science, Terahertz technology

MEDICAL SCIENCES

Epigenetics

Science Watch, 01FEB2013

The term “epigenetics” denotes control over the expression of genes in ways that are “above” or “in addition to” genetics itself. At the molecular level, it involves the addition of chemical markers to the DNA itself or to the histone proteins around which DNA is wrapped. The annual number of epigenetics papers indexed by Thomson Reuters over the 20-year period illustrates an eight-fold increase from just over 1,000 papers in 1992 to more than 8,500 in 2011.

Tags: Medical Sciences, Biology

MICROELECTRONICS

How to Build a Nanotube Computer

MIT Technology Review, 05FEB2013

Researchers at IBM have assembled 10,000 carbon nanotube transistors on a silicon chip. They are etching tiny trenches on silicon and using a multistep process to precisely align semiconducting nanotubes in them. Then they add metal contacts to test the nanotubes' performance. The company hopes that since the process uses a silicon substrate, eventually it can be inserted as a few extra steps within existing fabrication plants. [TECHNICAL ARTICLE](#)

Tags: Microelectronics, Information technology

Semiconductor physics: Taking control of spin

Science Daily, 04FEB2013

After a successful theoretical demonstration by researchers in Singapore, generating and sustaining electrical currents with unique properties for information processing comes closer to reality. [TECHNICAL ARTICLE](#)

Tags: Microelectronics

PHOTONICS

Can strain magnetize light?

Nature Photonics, 31JAN2013

Strain in photonic structures can induce pseudomagnetic fields and Landau levels. Nature Photonics spoke to Mordechai Segev, Mikael Rechtsman, Alexander Szameit and Julia Zeuner about their unique approach. [TECHNICAL ARTICLE](#)

Tags: Photonics

QUANTUM SCIENCE

An ideal material: Solving a mystery leads to the discovery of a true topological insulator

Science Daily, 04FEB2013

Researchers in the US have recently confirmed that Samarium hexaboride (SmB₆) material is the first true 3D topological insulator as predicted in 2010. Topological insulators have the potential to study quantum Hall physics and exotic states such as Majorana fermions. The discovery will lead to a clearer understanding of this strange physics and even new quantum devices.

Tags: Quantum science

Into the Quantum Internet at the Speed of Light

Science Daily, 04FEB2013

Researchers in Austria report how they have directly transferred the quantum information stored in an atom onto a particle of light. Such information could then be sent over optical fiber to a distant atom. [TECHNICAL ARTICLE](#)

Tags: Quantum science, Breakthrough technology

New Order Found in Quantum Electronic Material: May Lead to New Materials, Magnets and Superconductors

Science Daily, 30JAN2013

Researchers at Rutgers University have proposed an explanation for a new type of order, or symmetry, in an exotic material made with uranium—a theory that may one day lead to enhanced computer displays and data storage systems and more powerful superconducting magnets for medical imaging and levitating high-speed trains.

[TECHNICAL ARTICLE](#)

Tags: Quantum science

S&T POLICY

Exploring the Use of Computer Simulations in Unraveling Research and Development Governance Problems

NASA News, 01FEB2013

This paper discusses current Modeling and Simulation (M&S) methods, addressing their applicability to R&D enterprise governance. Specifically, the authors analyze advantages and disadvantages of the four methodologies used most often by M&S practitioners. [FULL PAPER](#)

Tags: S&T policy

SCIENCE WITHOUT BORDERS

Best Science and Engineering Visualizations of 2012

Wired, 01FEB2013

Thousands of words would spill out of these visualizations, the winners of the 2012 International Science and Engineering Visualization Challenge. From glowing corals to spiky seeds to neural networks on a chip, these images speak more clearly than any report ever could.

Tags: Science without borders

STEM

STEM Education: An Update and Overview of Policy Discussions

American Institute of Physics, 04FEB2013

The National Science and Technology Council's Committee on Science, Technology, Engineering, and Math Education (CoSTEM), established by the America COMPETES Act of 2010, created an inventory in February 2012 of Federal STEM education activities and developed a 5-year strategic Federal STEM education plan.

Tags: STEM ■

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This publication is authored and distributed by:

Dr. Melissa Flagg
Director, Office of
Technical Intelligence (OTI)

Ms. Hema Viswanath
OTI Corporate Librarian