



S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

[Advanced manufacturing \(1\)](#)

[Advanced materials \(4\)](#)

[Autonomous systems & robotics \(2\)](#)

[Biotechnology \(5\)](#)

[Communications technology \(2\)](#)

[Cyber security \(1\)](#)

[Energy \(1\)](#)

[Environmental science \(2\)](#)

[Materials science \(7\)](#)

[Microelectronics \(3\)](#)

[Neuroscience \(3\)](#)

[Photonics \(3\)](#)

[Quantum science \(2\)](#)

[Science without borders \(1\)](#)

FEATURE ARTICLES

[Bringing Light to a Halt: Physicists Freeze Motion of Light for a Minute](#)

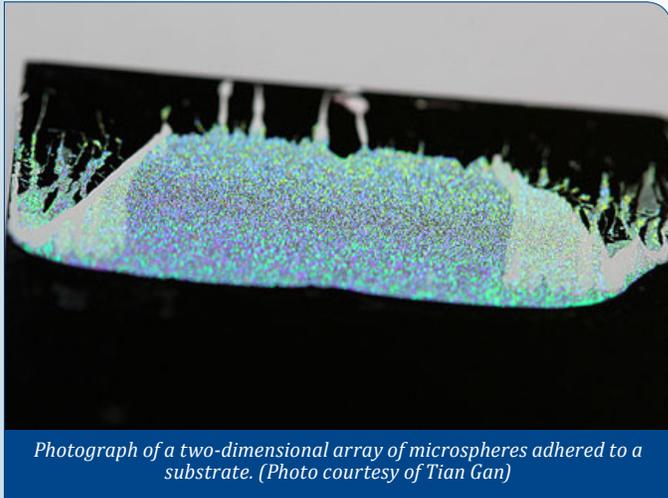
[Science Daily, 06AUG2013](#)

Researchers in Germany stopped light for about one minute. They were also able to save images that were transferred by the light pulse into the crystal for a minute—a million times longer than previously possible. The result will have practical significance in future data processing systems that operate using light. [TECHNICAL ARTICLE](#)

Tags: Photonics, Featured Article

[A layer of tiny grains can slow sound waves](#)

[Nanowerk, 05AUG2013](#)



Photograph of a two-dimensional array of microspheres adhered to a substrate. (Photo courtesy of Tian Gan)

Researchers at MIT have created two-dimensional arrays of micrograins that can funnel acoustic waves, much as specially designed crystals can control the passage of light or other waves. Findings could lead to a new way of controlling frequencies in electronic devices such as cellphones, but with components that are only a fraction of the size of those currently used for that function. [TECHNICAL ARTICLE](#)

Tags: Materials science, Featured Article

S&T NEWS ARTICLES

ADVANCED MANUFACTURING

[Game Changer for Synthesizing New Materials: Method Synthesizes Thousands of New Compounds With Ultra Low Thermal Conductivity](#)

[Science Daily, 31JUL2013](#)

Researchers in Oregon have developed a method which involves controlling the local compositions and diffusion distances of the precursor to guide the formation process so the constituent layers come together predictably. [TECHNICAL ARTICLE](#)

Tags: Advanced manufacturing

ADVANCED MATERIALS

[Understanding Interface Properties of Graphene Paves Way for New Applications](#)

[Science Daily, 05AUG2013](#)

Researchers from North Carolina State University and the University of Texas looked at how a graphene monolayer interfaces with an elastic substrate. Specifically, they wanted to know how strong the bond is between the two materials because that tells engineers how much strain can be transferred from the substrate to the graphene, which determines how far graphene can be stretched. [TECHNICAL ARTICLE](#)

Tags: Advanced materials, Materials science

[Materials Break, Then Remake, Bonds to Build Strength: Bending Synthetic Material Makes It Stronger, Not Weaker](#)

[Science Daily, 04AUG2013](#)

Duke University researchers are developing new materials which have characteristics already in place so that when a stress triggers a bond to break, it breaks in a way that triggers a subsequent reaction forcing the busted atomic bonds to reform new ones. [TECHNICAL ARTICLE](#)

Tags: Advanced materials

continued...

[BACK TO TOP](#)

[New Coating Turns Ordinary Glass Into Super Glass](#)

Science Daily, 04AUG2013

SLIPS (Slippery Liquid-Infused Porous Surfaces), developed by researchers at Harvard University, was inspired by the slick strategy of the carnivorous pitcher plant, which lures insects onto the ultraslippery surface of its leaves. Unlike earlier water-repelling materials, SLIPS repels oil and sticky liquids like honey, and it resists ice formation and bacterial biofilms as well. [TECHNICAL ARTICLE](#)

Tags: *Advanced materials*

[Smart materials: Fused liquid marbles show their strength](#)

PhysOrg.com, 31JUL2013

'Liquid marbles' are a peculiar new substance made by rolling water droplets into powders incapable of dissolving in water which can speed along surfaces without leaving water marks. Such non-stick, hydrophobic behavior has potential application in drug-delivery and microfluidic technology. Researchers in Singapore have developed a scheme to stabilize their erratic structures prone to collapse using vapors from ordinary superglue. [TECHNICAL ARTICLE](#)

Tags: *Advanced materials, Materials science*

AUTONOMOUS SYSTEMS & ROBOTICS

[Video Friday: Baxter Gets a Turbo Mode, Nao Steps on Things, and Robonaut Doesn't Like You](#)

IEEE Spectrum, 02AUG2013

Intuitive Surgical's DaVinci system has dominated the robotic surgery market for years, but robotics has advanced enough that it's possible to build a similar robot for a lot less money.

Tags: *Autonomous systems & robotics*

[Top Robotic Helicopter Team Sets Sights on Impossible Mission](#)

Newswise, 01AUG2013

University of Michigan group came closest of the 21 participating teams in the International Aerial Robotics Competition: Build a three-pound flying machine that can, under its own control, take off, fly through a window into a model building, avoid security lasers, navigate the halls, recognize signs, enter the correct room, find a flash drive in a box on a desk, pick it up, leave a decoy, exit and land in under 10 minutes. [Team's blog](#)

Tags: *Autonomous systems & robotics*

BIOTECHNOLOGY

[The Molecule 'Scanner': World's Smallest Terahertz Detector Invented](#)

Science Daily, 05AUG2013

Researchers at the University of Pittsburgh believe that with the detector they invented it would be possible

to isolate and probe single nanostructures and even molecules—performing 'terahertz spectroscopy' at the ultimate level of a single molecule. Such resolution will be unprecedented and could be useful for fundamental studies as well as more practical applications. [TECHNICAL ARTICLE](#)

Tags: *Biotechnology, Terahertz technology*

[How to grow a burger in the lab \(w/video\)](#)

BBC News, 04AUG2013

Researchers will unveil the world's first lab-grown burger in London later today. It has been grown from stem cells taken from a dead cow. Prof Mark Post of Maastricht University, Netherlands, who led the research, explains how the burger was made and reveals the freezers full of ingredients.

Tags: *Biotechnology*

[Researchers Dismantle Bacteria's War Machinery](#)

Science Daily, 04AUG2013

Certain bacteria, including *Staphylococcus aureus*, have the ability to deploy tiny darts. Researchers in Switzerland were able to show how, in time, these long molecules unfold to form a kind of spur. In Petri dishes the researchers could, at will, cause the formation of these darts, thereby exposing microorganisms to digestive enzymes. [TECHNICAL ARTICLE](#)

Tags: *Biotechnology, Biology*

[Light That Moves and Molds Gels](#)

Science Daily, 01AUG2013

Some animals—like the octopus and cuttlefish—transform their shape based on environment, fending off attackers or threats in the wild. Researchers at the University of Pittsburgh have demonstrated such a biomimetic response using hydrogels—a material that constitutes most contact lenses and microfluidic or fluid-controlled technologies.

[TECHNICAL ARTICLE](#)

Tags: *Biotechnology, Biomimetics*

[Scientists Discover Mineral-Making Secrets Potentially Useful for New Materials](#)

Science Daily, 01AUG2013

Virginia Tech researchers have discovered that certain types of sugars, known as polysaccharides, may also control the timing and placement of minerals that animals use to produce hard structures. [TECHNICAL ARTICLE](#)

Tags: *Biotechnology, Biology*

COMMUNICATIONS TECHNOLOGY

[Reliable Communication, Unreliable Networks](#)

Science Daily, 05AUG2013

Researchers at MIT present a new framework for analyzing ad hoc networks in which the quality of the communications links fluctuates. Within that framework,

continued...

“Anybody can make the simple complicated.
Creativity is making the complicated simple.” CHARLES MINGUS

they provide mathematical bounds on the efficiency with which messages can propagate through the network, and they describe new algorithms that can achieve maximal efficiency.

Tags: Communications Technology

[Toward harmonised aircraft communication](#) EU R&D News, 01AUG2013

The EU funded project SANDRA (Seamless Aeronautical Networking through integration of Data links Radios and Antennas) is working to integrate today's complex and disparate aircraft communications into a coherent digital architecture, merging a full range of applications and services.

Tags: Communications Technology

CYBER SECURITY

[Georgia Tech uncovers iOS security weaknesses](#) EurekAlert, 31JUL2013

Researchers at Georgia Tech developed a proof-of-concept attack, called Jekyll, which rearranges its own code to create new functionality that is not exhibited during Apple's approval process, the mandatory app review process to ensure that only approved apps can run on iOS devices.

Tags: Cyber security

ENERGY

[New Water Splitting Technique Efficiently Produces Hydrogen Fuel](#) Science Daily, 01AUG2013

A University of Colorado Boulder team has developed a radically new technique that uses the power of sunlight to efficiently split water into its components of hydrogen and oxygen, paving the way for the broad use of hydrogen as a clean, green fuel. [TECHNICAL ARTICLE](#)

Tags: Energy

ENVIRONMENTAL SCIENCE

[Climate Science Boost With Tropical Aerosols Profile](#) Science Daily, 02AUG2013

According to researchers in Australia, fine particles generated by burning of the tropical savanna of Northern Australia are a globally significant aerosol source, with impacts on regional climate and air quality. Australia's biomass burning emissions comprise about eight per cent of the global total, ranking third by continent behind Africa (48 per cent) and South America (27 per cent). [TECHNICAL ARTICLE](#)

Tags: Environmental science, Climatology

[Mission to build world's most advanced telescope reaches major milestone](#)

PhysOrg.com, 01AUG2013

With the signing last week of a “master agreement” for the Thirty Meter Telescope—destined to be the most advanced and powerful optical telescope in the world—the University of California and UCLA moved a step closer to peering deeper into the cosmos than ever before. [More about the telescope.](#)

Tags: Environmental science, Astronomy, Space technology

MATERIALS SCIENCE

[High-speed camera captures dancing droplets for scientific ‘photo album,’ study \(w/ Video\)](#)

PhysOrg.com, 06AUG2013

Cornell University researchers have produced a high-resolution “photo album” of more than 30 shapes an oscillated drop of water can take. The results, a fundamental insight into how droplets behave, could have applications in everything from inkjet printing to microfluidics.

Tags: Materials science

[New technique allows closer study of how radiation damages materials](#)

e! Science News, 06AUG2013

A team of researchers led by North Carolina State University has developed a technique that provides real-time images of how magnesium changes at the atomic scale when exposed to radiation. The technique may give researchers new insights into how radiation weakens the integrity of radiation-tolerant materials, such as those used in space exploration and in nuclear energy technologies.

Tags: Materials science

[Scientists discover hidden magnetic waves in high-temperature superconductors](#)

PhysOrg.com, 05AUG2013

In a new study scientists at DOE's Brookhaven Laboratory found that unexpected magnetic excitations exist in both non-superconducting and superconducting materials. Proving or disproving this hypothesis remains one of the holy grails of condensed matter physics research.

[TECHNICAL ARTICLE](#)

Tags: Materials science, Government S&T

[Engineers gain insight into turbulence formation and evolution in fluids](#)

PhysOrg.com, 31JUL2013

Researchers in the US and UK have developed a new and improved way of looking at the composition of turbulence

continued...

near walls, the type of flow that dominates our everyday life. Their research could lead to significant fuel savings, as a large amount of energy is consumed by ships and planes to counteract turbulence-induced drag.

Tags: Materials science

Key Factors for Wireless Power Transfer

[Science Daily, 31JUL2013](#)

A team of researchers from the US and Norway discovered that resonance frequency matching, alignment of the magnetic field, and impedance matching are the most important factors for efficient wireless power transfer. These findings are highly significant because one futuristic application of wireless power transfer would be to harness and use it via magnetic resonance to charge electric vehicles. [TECHNICAL ARTICLE](#)

Tags: Materials science

Nanomaterials: Sized-Up for Strength

[Science Daily, 31JUL2013](#)

A team of researchers from the US and Singapore have determined how miniaturization and intrinsic granular structure impact the deformation of ultra-small platinum cylinders. They are examining the effects of microstructural flaws and oxidations on the mechanical behavior of nanomaterials. [TECHNICAL ARTICLE](#)

Tags: Materials science, Advanced materials

FEATURED RESOURCE

MIT Video

Aggregates and curates video produced by the Institute's offices, laboratories, centers and administration. This includes feature and editorial videos, event recordings, academic content and more.

MICROELECTRONICS

Novel CNT-copper nanocomposite delivers a 100-fold increase in current density

[Nanowerk, 06AUG2013](#)

Researchers in Japan have developed a carbon nanotube-copper (CNT-Cu) nanocomposite material that overcomes the mutual exclusivity of high ampacity and high conductivity by effectively combining the strengths of copper (high electrical conductivity) and CNTs (high current density tolerance) into one integrated composite material. [TECHNICAL ARTICLE](#)

Tags: Microelectronics, S&T Japan

Moving towards electronically active threads

[Printed Electronics World, 31JUL2013](#)

Researchers in Germany have developed a machine with which electronically active materials can be vacuum deposited onto threads. In theory, reproducible rotational coating with semiconductor components opens up a whole new world of possibilities in smart textiles.

Tags: Microelectronics, Flexible electronics, S&T Germany, Semiconductors

Oxide semiconductors - where do they fit?

[Printed Electronics World, 31JUL2013](#)

This article summarises some of the technology and market analysis from the IDTechEx research report [Metal Oxide TFT Backplanes for Displays 2013-2018: Analysis, Trends, Forecasts](#).

Tags: Microelectronics, Semiconductors

NEUROSCIENCE

Practice makes the brain's motor cortex more efficient

[Science Daily, 04AUG2013](#)

Researchers at the University of Pittsburgh have shown that practice leads to decreased metabolic activity for internally generated movements, but not for visually guided motor tasks, and suggest the motor cortex is "plastic" and a potential site for the storage of motor skills. [TECHNICAL ARTICLE](#)

Tags: Neuroscience

Largest neuronal network simulation to date achieved using Japanese supercomputer

[Science Daily, 02AUG2013](#)

Using NEST, an open-source software, researchers in Japan succeeded in simulating a network consisting of 1.73 billion nerve cells connected by 10.4 trillion synapses. To realize this feat, the program recruited 82,944 processors of the K Computer. The process took 40 minutes, to complete the simulation of 1 second of neuronal network activity in real, biological, time.

Tags: Neuroscience, S&T Japan

Stimulating Brain Cells Can Make False Memories

[Science Daily, 01AUG2013](#)

Howard Hughes Medical Institute researchers have discovered how to alter animals' memories by turning on neurons in the brain that are associated with the memories and updating them with new information. [TECHNICAL ARTICLE](#)

Tags: Neuroscience

PHOTONICS

Universal Law for Light Absorption in 2-D Semiconductors

Science Daily, 31JUL2013

Researchers at DOE's Lawrence Berkeley National Laboratory have discovered a quantum unit of photon absorption, which they have dubbed "AQ," that should be general to all 2D semiconductors, including compound semiconductors of the III-V family that are favored for solar films and optoelectronic devices. [TECHNICAL ARTICLE](#)

Tags: Photonics, Microelectronics

Novel Hollow-Core Optical Fiber to Enable High-Power Military Sensors

DARPA News, 17JUL2013

The intensity of light that propagates through glass optical fiber is fundamentally limited by the glass itself. A novel fiber design using a hollow, air-filled core removes this limitation and dramatically improves performance by forcing light to travel through channels of air, instead of the glass around it. DARPA's unique spider-web-like, hollow-core fiber, design is the first to demonstrate single-spatial-mode, low-loss and polarization control—key properties needed for advanced military applications such as high-precision fiber optic gyroscopes for inertial navigation.

Tags: Photonics, DARPA, Government S&T

QUANTUM SCIENCE

Quantum communication controlled by resonance in 'artificial atoms'

Nanowerk, 06AUG2013

The problem with the quantum world, however, is that you cannot allow these states to be measured, or all of the quantum magic disappears. Researchers in the US and Germany have developed a new way of controlling the electrons so that the quantum state can be controlled without measurement, using resonances familiar in atomic physics, now applied to these artificial atoms.

Tags: Quantum science, Communications Technology

Towards a global quantum network: Photoelectron trapping in double quantum dots

PhysOrg.com, 31JUL2013

Researchers in the US, Japan and Germany found that nondestructive measurement is feasible using gallium arsenide double quantum dots (DQDs), thereby taking a significant step towards long distance entanglement distribution. [TECHNICAL ARTICLE](#)

Tags: Quantum science

SCIENCE WITHOUT BORDERS

The Sun's magnetic field is about to flip

PhysOrg.com, 06AUG2013

According to researchers at Stanford University we're no more than 3 to 4 months away from a complete field reversal. This change will have ripple effects throughout the solar system. The domain of the sun's magnetic influence extends billions of kilometers beyond Pluto.

Tags: Science without borders ■

ABOUT THIS PUBLICATION

The appearance of external hyperlinks in this publication does not constitute endorsement by the United States Department of Defense (DoD) of the linked web sites, nor the information, products or services contained therein. In addition, the content featured does not necessarily reflect DoD's views or priorities.

To subscribe (or unsubscribe), visit <https://tin-ly.sainc.com/ASDRE>. To provide feedback or ask questions, contact us at asdre-st-bulletin-reply@sainc.com.

This publication is authored and distributed by:

Dr. Brian Beachkofski
Director, Office of
Technical Intelligence (OTI)

Ms. Hema Viswanath
OTI Corporate Librarian