



# S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

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## FEATURE ARTICLES

### [New material shares many of graphene's unusual properties](#)

[MIT News, 24APR2012](#)

Thin films of bismuth-antimony have potential for new semiconductor chips, thermoelectric devices. Graphene, a single-atom-thick layer of carbon, has spawned much research into its unique electronic, optical, and mechanical properties. Now, researchers at MIT have found another compound that shares many of graphene's unusual characteristics—and in some cases has interesting complementary properties to this much-heralded material.

*Tags: Advanced materials, Materials science, Featured Article*

### [Single nanomaterial yields many laser colors](#)

[Science Daily, 29APR2012](#)

The materials in prototype lasers are colloidal quantum dots, or nanocrystals, with an inner core of cadmium and selenium alloy and a coating of zinc, cadmium, and sulfur alloy, and a proprietary organic molecular glue. Researchers synthesize the nanocrystals using a wet chemistry process that allows them to precisely vary the nanocrystal size by varying the production time. Size is all that needs to change to produce different laser light colors: 4.2 nanometer cores produce red light, 3.2 nanometer ones emit green light and 2.5 nanometer ones shine blue. In experiments, light amplification required much less power than previous attempts at the technology. The team's prototypes are the first lasers of their kind. **TECHNICAL ARTICLE**

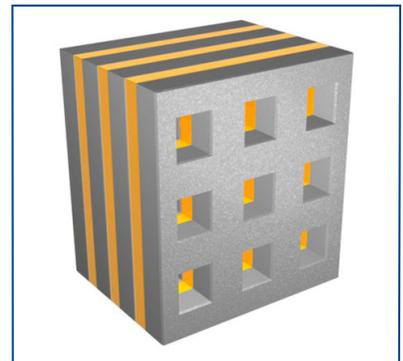
*Tags: Breakthrough technology, Advanced materials, Breakthrough technology, Quantum dots, Quantum science, Featured Article*

### [Metamaterials Step Into the Light](#)

[IEEE Spectrum, 26APR2012](#)

A silver-and-glass nano-fishnet brings the weird optics of metamaterials into the range of light we can see. Scientists in England and Valencia, Spain, have constructed what may be the first practical metamaterial that manipulates visible light. The researchers predict it could be used for subpicosecond optical switches and finely controlled laser pulses. The layered structure of the team's material, in contrast to the makeup of earlier visible-light devices, means it can conceivably be built up into a usable, full-size object. However, not everyone is convinced this is possible.

*Tags: Advanced materials, Materials science, Metamaterials, Featured Article*



**LIGHT THROUGH LAYERS:** Layers of silver and glass in a nanofishnet array make for a metamaterial that bends light the wrong way. Image: Carlos García Meca

## S&T NEWS ARTICLES

### ADVANCED MANUFACTURING

#### [Testing technology finds assembly errors quickly](#)

[R&D Magazine, 30APR2012](#)

Researchers in Germany are testing a new system that is flexible and economical, even for smaller production runs. The automated visual testing system generates a digital template and uses it to compare with the assembled components. It reliably identifies any errors. What's new about this system is that it converts specifications from the design models into images and 3-D data that the system can then compare with the real images.

*Tags: Advanced manufacturing, S&T Germany*

*continued...*

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## [Toyota shows innovations in production methods](#)

R&D Magazine, 24APR2012

Toyota says it is putting renewed focus on innovation in its production methods after getting a wake-up call on quality from its massive recalls. A highly flexible assembly line that can grow or shrink over a weekend to adjust to demand was among the innovations Toyota Motor Corp. showed Tuesday in production technology.

Tags: *Advanced manufacturing*

## ADVANCED MATERIALS

### [Improving on the amazing: Scientists seek new conductors for metamaterials](#)

Nanowerk, 01MAY2012

Scientists at the U.S. Department of Energy's Ames Laboratory have designed a method to evaluate different conductors for use in metamaterial structures, which are engineered to exhibit properties not possible in natural materials. While neither graphene nor superconductors will immediately fix losses in metamaterials, researchers' work provides a method for evaluating future candidates to replace gold or silver that will help harness the enormous potential of metamaterials.

Tags: *Advanced materials*

### [Folding light: Wrinkles and twists boost power from solar panels](#)

Nanowerk, 27APR2012

Taking their cue from the humble leaf, researchers at Princeton University have used microscopic folds on the surface of photovoltaic material to significantly increase the power output of flexible, low-cost solar cells. They reported that the folds resulted in a 47 percent increase in electricity generation. The finely calibrated folds on the surface of the panels channel light waves and increase the photovoltaic material's exposure to light.

Tags: *Advanced materials, Energy, Solar energy*

### [Wearable electronics: Transparent, lightweight, flexible conductor could revolutionize electronics industry](#)

Science Daily, 27APR2012

Called GraphExeter, the material could revolutionize the creation of wearable electronic devices, such as clothing containing computers, phones and MP3 players. Adapted from graphene, GraphExeter is much more flexible than indium tin oxide (ITO), the main conductive material currently used in electronics. ITO is becoming increasingly expensive and is a finite resource, expected to run out in 2017. [TECHNICAL ARTICLE](#)

Tags: *Advanced materials, Flexible electronics, S&T UK*

### [Nano Graveyard and other amazing nanotechnology images](#)

Nanowerk, 26APR2012

As a special feature of recent MRS Meetings, the MRS has offered the popular Science as Art competitions, with entry open to all registered meeting attendees. The images presented in this article represent some of the best entries from past meetings. You can find other nanotechnology images [here](#).

Tags: *Advanced materials, Nanotechnology*

### [Through a glass, clearly](#)

MIT News, 26APR2012

MIT researchers find a way to make glass that's anti-fogging, self-cleaning and free of glare. The new "multifunctional" glass, based on surface nanotextures that produce an array of conical features, is self-cleaning and resists fogging and glare, the researchers say. Ultimately, they hope it can be made using an inexpensive manufacturing process that could be applied to optical devices, the screens of smartphones and televisions, solar panels, car windshields and even windows in buildings.

Tags: *Advanced materials, Materials science*

## AUTONOMOUS SYSTEMS & ROBOTICS

### [Flapping Robotic Birdplane Lands Right on Your Hand](#)

IEEE Spectrum, 02MAY2012

Part of what makes this robot (under development at the University of Illinois at Urbana-Champaign) so cool is the fact that it uses flapping wings for extra maneuverability and, one has to assume, at least a little bit of thrust. This bio-inspired model can reorient its wings while gliding, providing glide-phase control without a bunch of extra complicated and heavy actuators. [VIDEO](#)

Tags: *Autonomous systems & robotics*

### [Swiss scientists debut telepathic robot interface to aid the disabled](#)

Digital Trends, 27APR2012

A group of Swiss scientists have unveiled a new interface system that allows partially paralyzed patients to remotely control helpful robots using only the power of their minds. Though similar to research conducted in Germany and America, the greatest coup of this particular project is that the interface doesn't require users to have received invasive brain implants.

Tags: *Autonomous systems & robotics, Robotics*

### [Video Friday: Festo's ExoHand, Russian Robonaut, and Hugvie the Huggable Robot](#)

IEEE Spectrum, 27APR2012

Today we bring you robot videos featuring hands, humanoids, and hugs.

Tags: *Autonomous systems & robotics*

“Technology shapes society and society shapes technology.” ROBERT W. WHITE

### **Mech Warfare Rocks RoboGames 2012 (videos)**

[IEEE Spectrum, 26APR2012](#)

RoboGames is the Olympics of Robots—we invite the best minds from around the world to compete in over 50 different events: combat robots, fire-fighters, LEGO bots, hockey bots, walking humanoids, soccer bots, sumo bots, and even androids that do kung-fu. Some robots are autonomous, some are remote controlled—but they’re all cool! As an open event, anyone can compete. [VIDEO](#)

*Tags: Autonomous systems & robotics*

### **U.S. Military Robots Of The Future: Visual Tour**

[Information Week, 25APR2012](#)

Meet robots that fight fires, climb ladders, search for bombs, and race across the battlefield. The technological singularity is near, say military strategists.

*Tags: Autonomous systems & robotics*

## BREAKTHROUGH TECHNOLOGY

### **New particle discovered at CERN**

[Science Daily, 27APR2012](#)

Physicists have discovered a previously unknown particle composed of three quarks in the Large Hadron Collider (LHC) particle accelerator. A new baryon could thus be detected for the first time at the LHC. The baryon known as  $\Xi_b^*$  confirms fundamental assumptions of physics regarding the binding of quarks. [TECHNICAL ARTICLE](#)

*Tags: Breakthrough technology*

### **Can future actions influence past events? Experiment mimics quantum physics ‘spooky action into the past’**

[Science Daily, 25APR2012](#)

Physicists at the University of Vienna have, for the first time, demonstrated in an experiment that the decision whether two particles were in an entangled or in a separable quantum state can be made even after these particles have been measured and may no longer exist.

[TECHNICAL ARTICLE](#)

*Tags: Breakthrough technology, Quantum science*

## COMMUNICATIONS TECHNOLOGY

### **A new generation of ultra-small and high-precision lasers emerges**

[EurekaAlert, 27APR2012](#)

Flexible and effective, this ultra-small laser stands out for its mode of operation. Researchers in Canada developed a ring resonator (a key laser component) that has the unique feature of playing a dual role by acting both as a filter and a non-linear element. This is the first time

researchers have successfully integrated a resonator and a micro-ring in the laser component that makes it possible to better control the light source. It is manufactured using a special glass capable of harnessing the nonlinear optical properties central to laser operation. [TECHNICAL ARTICLE](#)

*Tags: Communications Technology, Photonics*

## COUNTER WMD

### **Novel radiation surveillance technology could help thwart nuclear terrorism**

[Science Daily, 01MAY2012](#)

The GTRI team is utilizing novel materials and nanotechnology techniques to produce improved radiation detection. The researchers have developed the Nano-photon Composite Scintillation Detector, a prototype that combines rare-earth elements and other materials at the nanoscale for improved sensitivity, accuracy and robustness. The system could be used to enhance radiation-detection devices used at ports, border crossings, airports and elsewhere.

*Tags: Counter WMD*

## CYBER SECURITY

### **Spot a bot to stop a botnet**

[EurekaAlert, 01MAY2012](#)

Researchers in India have developed a technique that uses a two-pronged strategy involving a standalone and a network algorithm. The standalone algorithm runs independently on each node of the network and monitors active processes on the node. If it detects suspicious activity, it triggers the network algorithm. The network algorithm then analyzes the information being transferred to and from the hosts on the network to deduce whether or not the activity is due to a bot or a legitimate program on the system.

*Tags: Cyber security*

### **Thwarting the cleverest attackers**

[MIT News, 01MAY2012](#)

The time it takes a computer to store data in memory, fluctuations in its power consumption and even the noises it emits can betray information to a savvy assailant. Attacks that use such indirect sources of information are called side-channel attacks, and the increasing popularity of cloud computing makes them an even greater threat. Researchers at MIT have developed a technique that could mitigate side-channel attacks. In addition to preventing attacks on private information, the technique could also protect devices that use proprietary algorithms so that they can't be reverse-engineered by pirates or market competitors.

*Tags: Cyber security*

*continued...*

## ENERGY

**Researchers develop a path to liquid solar cells that can be printed onto surfaces**[EurekAlert, 25APR2012](#)

Scientists at the University of Southern California have developed a new surface coating for the nanocrystals, which are made of the semiconductor cadmium selenide. With a relatively low-temperature process, the researchers' method also allows for the possibility that solar cells can be printed onto plastic instead of glass without any issues with melting – resulting in a flexible solar panel that can be shaped to fit anywhere.

*Tags: Energy, Solar energy*

## FOREIGN S&amp;T

**China's space know-how said threat to U.S., Taiwan**[Reuters, 27MAY2012](#)

China's military is rapidly boosting its space programs to advance Communist Party interests "and defend against perceived challenges to sovereignty and territorial integrity," said the 84-page report by the Project 2049 Institute, a research group on Asia-Pacific security issues. [REPORT](#)

*Tags: Foreign S&T, S&T China*

**DARPA seeks technology to see through clouds for warfighter support**[DARPA, 01MAY2012](#)

"The goal is a synthetic aperture radar (SAR) that provides high-resolution, full-motion video to engage maneuvering ground targets through clouds or in the clear, without having to change tactics, techniques and procedures," said Bruce Wallace, DARPA program manager. "Ultimately, we intend to demonstrate a cloud-penetrating EHF sensor in a moveable gimbal that could be mounted on a variety of aerial platforms." [Solicitation](#)

*Tags: Government S&T, DARPA*

**NASA Starts Spending On Advanced Technology Aviation Week, 01MAY2012**

In the past month Chief Technologist Braun's office has awarded \$100,000 concept-study contracts for 30 ideas culled from "hundreds" of proposals for a new version of the old NASA Institute for Advanced Concepts (NIAC). Among ideas to be studied will be interplanetary cubesats, microrobots powered by microbial fuel cells and "photonic muscles" activated by laser light to move spacecraft components. One concept would meld small orbiters and rovers into "hoppers" able to explore the low-gravity asteroids that President Barack Obama wants humans to visit by 2025.

*Tags: Government S&T, NASA*

**PCAST releases assessment of National Nanotechnology Initiative**[Nanowerk, 27APR2012](#)

The President's Council of Advisors on Science and Technology (PCAST) has released its latest assessment of the National Nanotechnology Initiative (NNI): Report to the President and Congress on the Fourth Assessment of the National Nanotechnology Initiative. [REPORT](#)

*Tags: Government S&T, Nanotechnology*

**Army's 'Magic Bullet' Will Hang Out in Midair, But Won't Kill You**[Wired, 25APR2012](#)

This latest nonlethal weapon is a modification of something called the Lethal Miniature Aerial Munition System (LMAMS), something the Army explicitly compares to a "magic bullet." That warhead "should be capable to acquire a man-size target at the system's combat range, in less than 20 seconds, flying at an altitude of 100 meter[s] above ground," according to the Army's new solicitations for small business. "If conditions for attack are not met, LMAMS will be able to loiter over the target for up to 30 minutes."

*Tags: Government S&T, Military technology*

## FEATURED RESOURCE

**Forecasting Principles**

The Forecasting Principles site summarizes all useful knowledge about forecasting so that it can be used by researchers, practitioners, and educators. The site is devoted to improving decision making by furthering scientific forecasting. [well organized; many papers in full text; good source for journals and conferences on Forecasting] [RSS](#)

## GOVERNMENT S&amp;T

**DARPA Aims To Reuse Space Junk**[Information Week, 26MAY2012](#)

DARPA wants to turn disabled satellites and their components, including antennas and solar arrays, into functioning systems. The agency will host a conference in Arlington, VA on June 26 to explore ways to create refurbished satellite systems at a fraction of what it would cost to build them from scratch.

*Tags: Government S&T, DARPA*

## MATERIALS SCIENCE

**[Terahertz waves guarantee radar dome integrity](#)**[Fraunhofer Research Institute, 01MAY2012](#)

Radio signals reach pilots on board an aircraft through the radar dome, the rounded nose of the aircraft. But if imperfections are introduced during the production of this nose, it can impede radio traffic. Researchers at the Fraunhofer Institute have developed a prototype of the testing system. The system uses terahertz waves to completely scan the aircraft nose, which is several centimeters thick, and immediately identify any flaws. The main challenge was to find out which terahertz frequencies they would have to use to bombard the material to achieve the most effective results for the various imperfections.

*Tags: Materials science, Terahertz technology*

## MICROELECTRONICS

**[Why Moore's Law will collapse in the next decade](#)**[Digital Trends, 01MAY2012](#)

In this viral video, famed scientist Michio Kaku breaks down and explains what Moore's Law is and why we're about to reach its limits. Soon Silicon Valley may have to change its name. Kaku believes we are reaching the limits of silicon. In the next 10-20 years, we may have to move to molecular computing and maybe even quantum computing to continue expanding the limits of our technology. [VIDEO](#)

*Tags: Microelectronics, Information technology*

**[Moore's Law Lives Another Day](#)**[MIT Technology Review, 25APR2012](#)

The three-dimensional transistors of Intel's new generation of chips continue the 50-year trend of faster, more tightly packed chips. After the launch of Intel's newest line of processors, named Ivy Bridge, Moore's prediction is still looking sound. The chips are the first to become available from any company with features as small as 22 nanometers (the finest details on today's chips are 32 nanometers), allowing transistors to be smaller and packed more densely. Ivy Bridge chips offer 37 percent more processing speed than the previous generation of chips, and can match their performance while using just half the energy.

*Tags: Microelectronics*

## PHOTONICS

**[Scientists predict paradoxical laser effect](#)**[EurekAlert, 25APR2012](#)

An intriguing new effect in microlasers has been discovered by researchers at the Vienna University: Two microlasers can be coupled in such a way that they suppress each other and the laser system stays dark—even if both lasers are

supplied with energy and would emit light on their own. This is a new connection between laser physics and electronics.

*Tags: Photonics, Quantum science*

## QUANTUM SCIENCE

**[Research breakthrough takes supercomputing out of the lab](#)**[EurekAlert, 30APR2012](#)

Researchers in Toronto have successfully designed a new integrated counterpart to the delicate laboratory equipment that could produce the entangled photon pairs using an integrated circuit. Ultimately, the entire production of the photons could be completed using a single chip. The team in Toronto along with their colleagues at the University of Waterloo and Universität Innsbruck, have tested the first generation of these devices.

*Tags: Quantum science, Information technology, Supercomputer*

**[Tiny crystal revolutionizes computing \(w/ video\)](#)**[Nanowerk, 26APR2012](#)

A tiny crystal that enables a computer to perform calculations that currently stump the world's most powerful supercomputers has been developed by an international team of scientists from Australia and the US. Computing technology has taken a huge leap forward using a crystal with just 300 atoms suspended in space. [VIDEO](#)

*Tags: Quantum science*

## SCIENCE WITHOUT BORDERS

**[Printable spacecraft may flutter down on alien worlds](#)**[KurzweilAI, 27APR2012](#)

Research on the notion of printable spacecraft is being scoped out under the NASA Innovative Advanced Concepts (NIAC) program—one of many novel space initiatives detailed late last month at a NIAC symposium in Pasadena, CA. The project, if successful, could allow scientists to one day pepper other worlds with atmospheric "flutterflyers" as well as "flutterlanders"—devices the size of postage stamps or confetti that reach a surface imbued with sensor smarts.

*Tags: Science without borders, NASA*

**[Decision, decisions](#)**[Harvard University, 26APR2012](#)

Two of Harvard's leading social scientists discussed the way that humans make decisions, and whether having more choices really makes us happier.

*Tags: Science without borders*

## SENSORS

### [Superconducting strip could become an ultra-low-voltage sensor](#)

Nanowerk, 30APR2012

Researchers studying a superconducting strip observed an intermittent motion of magnetic flux which carries vortices inside the regularly spaced weak conducting regions carved into the superconducting material. These vortices resulted in alternating static phases with zero voltage and dynamic phases, which are characterised by non-zero voltage peaks in the superconductor.

*Tags: Sensors*

### [Ground sensors play key role in battlefield snooping](#)

Defense Systems, 25APR2012

New efforts seek to fuse systems for faster force reaction, greater situational awareness. A promising system for deployed combat troops' situational awareness may be the expendable, seismic "throw-about" that soldiers sprinkle through fields or other areas before moving on.

*Tags: Sensors, Military technology*

## STEM

### [Iran Nanotechnology Councils plans technically ambitious nanotech olympiad](#)

Nanowerk, 30APR2012

The Iran Nanotechnology Initiative Council (INIC) has decided to classify practical training and examination topics of the Students Nanotechnology Olympiad from this year on, officials announced on Monday [April 30]. "We had approximately 4,200 participants for the second Student Nanotechnology Olympiad and surprisingly encountered a 375 percent increase in this rate—that is 16,083 applicants" Ahmadvand added, explaining about the quadrupled participation rate this year.

*Tags: STEM, S&T Iran ■*

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