



S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

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FEATURE ARTICLES

[Don't blink! Why quantum dots suffer from 'fluorescence intermittency' and may be trouble for potential quantum Internet](#)

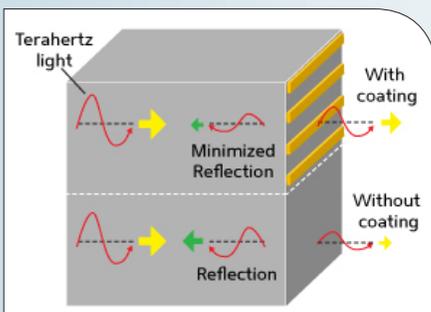
[Science Daily, 22MAY2014](#)

Indium arsenide and gallium arsenide (InAs/GaAs) quantum dots are considered to be promising as single photon sources for use in different future computing and communication systems. Researchers at NIST have found that these dots blink over timescales ranging from tens of nanoseconds to hundreds of milliseconds. Their results suggest that building photonic structures around the quantum dots may make them significantly less stable as a light source. [TECHNICAL ARTICLE](#)

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

[Improving terahertz optics with efficient broadband antireflection coatings](#)

[PhysOrg.com, 21MAY2014](#)



*Thin strips of chromium form an efficient anti-reflection coating for terahertz light and can be applied to a broad range of surfaces. Credit: A*STAR Institute of Materials Research and Engineering*

An international team of researchers (Singapore, Japan) developed antireflection coatings based on metamaterials, which are metallic structures that are much smaller than the wavelength used. These structures

completely alter the optical properties of a material in a predetermined way, enabling the generation of a much broader range of optical effects than those that occur naturally. One application of the unusual optical effects they produce is invisibility cloaks. [TECHNICAL ARTICLE](#)

Tags: Advanced materials, Featured Article

S&T NEWS ARTICLES

ADVANCED MATERIALS

[Molecules do the triple twist](#)

[Science Daily, 26MAY2014](#)

An international team of researchers (Germany, Finland, Japan, China) has managed to make a triple-Möbius annulene, the most twisted fully conjugated molecule to date. Currently these chiral one-sided compounds are merely scientifically intriguing topological objects, but they exhibit a high potential in future applications in molecular electronics and optoelectronics. [TECHNICAL ARTICLE](#)

Tags: Advanced materials, Materials science

[Flatland optics with graphene: Smaller and faster photonic devices and circuits](#)

[Science Daily, 23MAY2014](#)

Researchers in Spain show that dramatically squeezed graphene-guided light can be focused and bent, following the fundamental principles of conventional optics. The work opens new opportunities for smaller and faster photonic devices and circuits. [TECHNICAL ARTICLE](#)

Tags: Advanced materials

[Scientists discover new magnetic phase in iron-based superconductors](#)

[PhysOrg.com, 23MAY2014](#)

Scientists at the DOE's Argonne National Laboratory have discovered a previously unknown phase in a class of superconductors called iron arsenides. This sheds light on a debate over the interactions between atoms and electrons that are responsible for their unusual superconductivity. [TECHNICAL ARTICLE](#)

Tags: Advanced materials, Government S&T

AUTONOMOUS SYSTEMS & ROBOTICS

[Nature inspires drones of the future](#)

[Science Daily, 23MAY2014](#)

Based on the mechanisms adopted by birds, bats, insects and snakes, researchers in Japan have developed

continued...

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solutions to some of the common problems that drones could be faced with when navigating through an urban environment and performing novel tasks. [TECHNICAL ARTICLE](#)

Tags: Autonomous systems & robotics, S&T Japan

[Video Friday: Robotic Furniture, Pizza by Drone, and Series Elastic Snake Robot](#)

[IEEE Spectrum, 23MAY2014](#)

Elastic actuators are used in a robot snake. As the video shows, the series elastic actuators let the snake sense and control the torque on each of its joints, allowing it to perform lifelike motions without a complex controller.

Tags: Autonomous systems & robotics

BIOTECHNOLOGY

[Promising discovery in fight against antibiotic-resistant bacteria](#)

[Science Daily, 22MAY2014](#)

Researchers in Canada have discovered a small molecule that prevents bacteria from forming into biofilms that cause infections. The anti-biofilm peptide works on a range of bacteria including many that cannot be treated by antibiotics. [TECHNICAL ARTICLE](#)

Tags: Biotechnology, Biology, S&T Canada

COMMUNICATIONS TECHNOLOGY

[Network paradox may help algorithms overcome 'universal limitation'](#)

[PhysOrg.com, 20MAY2014](#)

Researchers at Indiana University suggest that the reason why high-quality communities are more difficult to detect for algorithms is that the algorithms are actually detecting subgroups that do not fully fit the intuitive definition of communities. Concrete applications of community detection algorithms range from the design of efficient navigation protocols in the Internet to the creation of efficient systems of recommendation of commercial products to customers.

[TECHNICAL ARTICLE](#)

Tags: Communications Technology

ENERGY

[Scientists develop new hybrid energy transfer system](#)

[Alphagalileo, 27MAY2014](#)

Researchers in the UK demonstrate a non-radiative, intermolecular energy transfer that exploits the intermediating role of light confined in an optical cavity. The technique exploits the formation of quantum states admixture of light and matter. The length over which the interaction takes places is considerably longer than conventional FRET-type processes. [TECHNICAL ARTICLE](#)

Tags: Energy, S&T UK

[Improved molten air battery operates at lower temperatures](#)

[Nanowerk, 26MAY2014](#)

A new class of high-density, rechargeable batteries has the potential to address the 'range anxiety' that is inherent to current electric vehicles by drastically increasing their battery capacity: molten air batteries have up to 50 times the storage capacity of lithium-ion batteries. [TECHNICAL ARTICLE](#)

Tags: Energy, Battery

[Crystal structure finding points to possible battery candidate](#)

[Science Daily, 22MAY2014](#)

Analysis of a manganese-based crystal by scientists at NIST and MIT has produced the first clear picture of its molecular structure. The findings could help explain the magnetic and electronic behavior of the whole family of crystals, many of which have potential for use in batteries. [TECHNICAL ARTICLE](#)

Tags: Energy, Battery

INFORMATION TECHNOLOGY

[Future IT challenges in scientific research](#)

[PhysOrg.com, 22MAY2014](#)

The LHC detectors at CERN produce a staggering one petabyte of data per second, even greater amounts of data is generated in various scientific domains, such as neurology, radio astronomy or genetics. In this context, CERN openlab together with a number of European laboratories, such as EMBL-EBI, ESA, ESRF, ILL, and researchers from the Human Brain Project, as well as input from leading IT companies, have published a whitepaper defining the ambitious challenges covering the most crucial needs of IT infrastructures. [Whitepaper](#)

Tags: Information Technology

MATERIALS SCIENCE

[Improving a new breed of solar cells](#)

[MIT News, 27MAY2014](#)

Researchers at MIT report that thin coatings of quantum dots allow them to absorb light very well but also work as a group, to transport charges. This allows those charges to be collected at the edge of the film, where they can be harnessed to provide electric current. The new work brings together developments from several fields to push the technology to unprecedented efficiency for a quantum-dot based system. [TECHNICAL ARTICLE](#)

Tags: Materials science, Solar energy

“If you don’t try to do things that are impossible, we’ll never accomplish the things that are nearly impossible.” CHAD NUSSBAUM

Soap films with complex shapes shed light on the formation of mathematical singularities (w/ Video)

PhysOrg.com, 27MAY2014

Researchers in the UK report that the way in which soap films collapse and re-form when twisted or stretched could hold the key to predicting the formation and location of mathematical singularities. Violent events also occur in the natural world—in fluid turbulence and in the motion of solar flares emanating from the sun—and one of the great challenges has been to predict where they will occur.

[TECHNICAL ARTICLE](#)

Tags: Materials science, S&T UK

Free Falling Matter Waves

American Physical Society Spotlight, 22MAY2014

An international team of researchers (Germany, USA) predict that gravitational acceleration may depend on an object’s properties, like its atomic makeup. A new experiment looks for such an effect by comparing for the first time the free-fall accelerations of different atomic elements in the same matter-wave interferometer. The results confirm the universality of free fall and may constrain alternative gravity models.

[TECHNICAL ARTICLE](#)

Tags: Materials science, Science without borders

Particles near absolute zero do not break the laws of physics after all

PhysOrg.com, 20MAY2014

Researchers in Germany have demonstrated that a theoretical model of the environment’s influence on a particle does not violate the third law of thermodynamics, despite appearances to the contrary. These findings are relevant for systems at the micro or nanometer scale that are difficult to decouple from the heat or the quantum effects exerted by their environment.

[TECHNICAL ARTICLE](#)

Tags: Materials science, S&T Germany

NEUROSCIENCE

Researchers find MS drug erases painful memories in mice

Medical Express, 26MAY2014

Researchers at Virginia Commonwealth University have found that giving fingolimod, a drug normally used to treat Multiple Sclerosis in people, to mice, caused them to lose memories they held of a recent painful event. Scientists are more interested in whether a drug that could erase bad memories might help people with PTSD and other psychological ailments related to traumatic experiences.

Tags: Neuroscience, Medical technology

Mind alteration device makes flies sing and dance

Science Daily, 25MAY2014

An international team of researchers (Austria, USA) have developed a device called FlyMAD for the thermogenetic control of flies. FlyMAD enabled scientists to target light or heat to specific body regions of flies in motion and to analyze the animals’ brain cells. Compared to other techniques, FlyMAD allows highly improved temporal resolution.

[TECHNICAL ARTICLE](#)

Tags: Neuroscience

Neuroscience’s grand question: How do neurons regenerate without losing memory?

Science Daily, 21MAY2014

An international team of researchers (USA, Belgium) reports that neurons need an internal gauge to monitor electrical activity and adjust ion channel expression accordingly. Because a single neuron is always part of a larger circuit, it also needs to do this while maintaining homeostasis across the nervous system.

[TECHNICAL ARTICLE](#)

Tags: Neuroscience

QUANTUM SCIENCE

Heads or tails: Experimental quantum coin flipping cryptography performs better than classical protocols

PhysOrg.com, 26MAY2014

An international team of researchers (France, Switzerland, Singapore) has experimentally implemented a quantum coin flipping protocol that performs better than any classical system over a distance suitable for deployment in metropolitan area optical networks. Based on an enhanced commercial QKD device, the approach is nearly perfectly secure against bounded adversaries.

[TECHNICAL ARTICLE](#)

Tags: Quantum science, Communications Technology

Advanced light: Sending entangled beams through fast-light materials

Science Daily, 25MAY2014

An international team of researchers (USA, France, Germany) has looked at how light traveling through so called “fast-light” materials does seem to advance faster than c, at least in one limited sense.

[TECHNICAL ARTICLE](#)

Tags: Quantum science

S&T POLICY

Quantum assisted GPS would be one thousand times more accurate than any existing GPS and other high potential DARPA projects[Next Big Future, 23MAY2014](#)

The DARPA director highlighted four technology projects in her recent testimony to the Senate Appropriations Committee. [TESTIMONY](#)

Tags: S&T policy, Government S&T

US particle-physics panel presents plan for the future[PhysOrg.com, 23MAY2014](#)

Among the recommendations made by the Particle Physics Project Prioritization Panel's (P5) 2014 report top priorities over the next two decades include the US playing a vital role in upgrades to the Large Hadron Collider (LHC) at CERN in Switzerland and building a long-baseline neutrino facility based at Fermilab near Chicago. [THE REPORT](#)

Tags: S&T policy, Particle physics

China in race to commercialize graphene[NOST \(China\), 20MAY2014](#)

In the field of manufacturing and commercialization of graphene, China is building up a strong position. Scientists have warned that it could take another 10 to 20 years before full-scale commercialization is achieved, although graphene-enhanced products could be launched within 12-18 months.

Tags: S&T policy, S&T China

FEATURED RESOURCE

Data.gov

Data.gov is the home of the US government's open data. You can find Federal, state and local data, tools, and resources to conduct research, build apps, design data visualizations, and more. It is an open source.

SCIENCE WITHOUT BORDERS

How Statisticians Found Air France Flight 447 Two Years After It Crashed Into Atlantic[MIT Technology Review, 27MAY2014](#)

After more than a year of unsuccessful searching, authorities called in an elite group of statisticians. Their analysis pointed to a location not far from the last known position. The wreckage was found almost exactly where they predicted at a depth of 14,000 feet after only one week's additional search. [TECHNICAL ARTICLE](#)

Tags: Science without borders, Mathematics

Researchers devise method to study network resistance to random failures based on 'random walks'[PhysOrg.com, 27MAY2014](#)

The concept of "random walks" developed by researchers in Spain can be programmed into virtually any network model to demonstrate the robustness of the network and how well it will operate when failures do occur. Thus, new networks can be put to the test before they are constructed, making them work better in the long run. [TECHNICAL ARTICLE](#)

Tags: Science without borders, Mathematics

From chaos to order: How ants optimize food search[Science Daily, 26MAY2014](#)

An international team of researchers (China, Germany) report that an individual ant searching for food walks in random ways. The animal movements at a certain point change from chaos to order. This happens in a self-organized way. It also provides a new perspective on behavioral patterns of humans in areas as diverse as the evolution of web services and smart transportation systems.

Tags: Science without borders, Biomimetics

Physicist suggests some types of wormholes may stay open long enough to send a photon through[PhysOrg.com, 21MAY2014](#)

Researchers in the UK suggest that there might be a way of taking advantage of Casimir energy that exists naturally in some wormholes. After a lot of calculating they found that if a wormhole was a lot longer than it is wide, the amount of Casimir energy present inside of it would be enough to cause it to stay open longer than normal. Just long enough, to send a photon through. [TECHNICAL ARTICLE](#)

Tags: Science without borders, S&T UK

SENSORS

New method discovered to protect against chemical weapons[Science Daily, 27MAY2014](#)

Researchers at Oregon State University have discovered that some compounds called polyoxoniobates can degrade and decontaminate nerve agents such as the deadly sarin gas, and have other characteristics that may make them ideal for protective suits, masks or other clothing. [TECHNICAL ARTICLE](#)

Tags: Sensors

Using thoughts to control airplanes

Science Daily, 27MAY2014

In order for humans and machines to communicate, brain waves of the pilots are measured using EEG electrodes connected to a cap. An algorithm developed by researchers in Germany allows the program to decipher electrical potentials and convert them into useful control commands. In flight simulator tests, they succeeded in demonstrating that brain-controlled flight is indeed possible—with amazing precision.

Tags: Sensors, S&T Germany

Chip produces and detects specialized gas for biomedical analysis

Science Daily, 22MAY2014

A microfluidic chip developed by researchers at NIST produces magnetized xenon gas and then detects even the faintest magnetic signals from the gas. Magnetized xenon can be used as a marker for detecting biomolecules in liquids. TECHNICAL ARTICLE

Tags: Sensors, Government S&T

Inspecting letters with terahertz waves

Science Daily, 22MAY2014

A new terahertz scanner developed by researchers in Germany is capable of detecting illicit drugs and explosives sent by post without having to open suspicious packages or envelopes.

Tags: Sensors, S&T Germany ■

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