

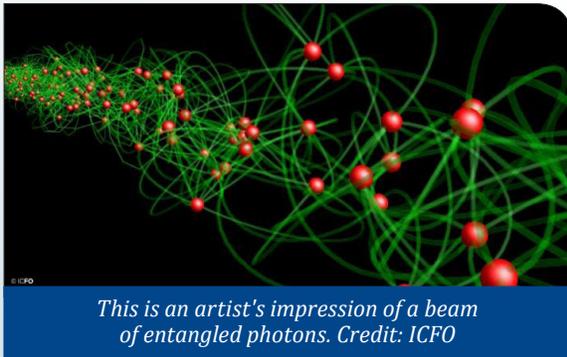
[Advanced materials \(8\)](#)[Autonomous systems & robotics \(1\)](#)[Biotechnology \(1\)](#)[Cyber security \(3\)](#)[Energy \(2\)](#)[Forecasting \(2\)](#)[Government S&T \(1\)](#)[Imaging technology \(1\)](#)[Information technology \(1\)](#)[Materials science \(1\)](#)[Microelectronics \(1\)](#)[Neuroscience \(1\)](#)[Photonics \(1\)](#)[Quantum science \(7\)](#)[Science without borders \(1\)](#)

FEATURE ARTICLES

[First glimpse inside a macroscopic quantum state](#)

Science Daily, 27MAR2015

Researchers in Spain were able to observe effects of entanglement



This is an artist's impression of a beam of entangled photons. Credit: ICFO

monogamy,

where particles can be strongly entangled only if they have few entanglement partners. The results of their study show promising advances for other macroscopic many-body systems and quantum gases such as Bose-Einstein condensates for the future study of superconductivity and superfluidity, optical communications, and research and development of qubits for quantum computing. [TECHNICAL ARTICLE](#)

Tags: [Quantum science](#), [Featured Article](#)

S&T NEWS ARTICLES

ADVANCED MATERIALS

[Wrapping carbon nanotubes in polymers enhances their performance](#)

Nanowerk, 30MAR2015

CNTs have a tendency to aggregate, forming “clumps” of tubes. To utilize their outstanding properties in applications, they need to be dispersed. As they are insoluble in many liquids, dispersion is difficult. Using non-covalent polymer wrapping, researchers in Japan have developed a technique that “exfoliates” aggregated clumps of CNTs and disperses them in solvents. [TECHNICAL ARTICLE](#)

Tags: [Advanced materials](#), [CNT](#), [S&T Japan](#)

[Light-emitting diode tech: Solving molybdenum disulfide's 'thin' problem](#)

Science Daily, 27MAR2015

In molybdenum disulfide (MoS_2) the amount of material that is available for light emission or light absorption is very limited. Researchers at Northwestern University designed and fabricated a series of silver nanodiscs and arranged them in a periodic fashion on top of a sheet of MoS_2 . They found that a disc with a diameter of 130 nanometers was best suited for enhancing light emission.

Tags: [Advanced materials](#)

[Nanoscale 'worms' provide new route to nano-necklace structures](#)

Nanowerk, 27MAR2015

Researchers at Georgia Institute of Technology have developed a template-based process that grows amphiphilic worm-like diblock copolymers through a living polymerization technique in which the polymeric structures serve as nanoreactors that form laterally connecting nanocrystalline structures based on a variety of precursor materials. They believe that an endless list of materials can be used to craft nano-necklaces.

[TECHNICAL ARTICLE](#)

Tags: [Advanced materials](#)

[Nanotechnology materials: opportunities and challenges go hand in hand](#)

Nanowerk, 27MAR2015

A publication by the European Commission—[Nanomaterials' functionality](#)—is a collection of 12 articles that highlight how nanotechnology is radically changing areas like energy harvesting and storage or make a better, cleaner and safer environment. No matter how positive some of these developments are, it is necessary to ask questions about engineered nanoparticles and how they interact with us, and whether they could lead to unforeseen hazards.

Tags: [Advanced materials](#)

Surface-modified nanoparticles endow coatings with combined properties

PhysOrg.com, 27MAR2015

Researchers in Germany use nanoparticles as design elements for multifunctional coatings. These nanoparticles are specifically adapted to the particular application by Small Molecule Surface Modification (SMSM). Researchers will demonstrate their technique at this year's Hannover Fair from 13 to 17 April.

Tags: *Advanced materials, S&T Germany*

Chemists make new silicon-based nanomaterials

Science Daily, 26MAR2015

Researchers at Brown University describe methods for making nanoribbons and nanoplates from silicon telluride. The materials are pure, p-type semiconductors that could be used in a variety of electronic and optical devices and batteries. Different structures can be made by varying the furnace temperature and using different treatments of the substrate. By tweaking the process, the researchers made nanoribbons that are about 50 to 1,000 nanometers in width and about 10 microns long. [TECHNICAL ARTICLE](#)

Tags: *Advanced materials*

Engineers create nanomaterials tougher than bulletproof vests

Nanowerk, 26MAR2015

Researchers at UT Dallas created new structures that exploit the electromechanical properties of specific nanofibers to stretch to up to seven times their length, while remaining tougher than Kevlar. These structures absorb up to 98 joules per gram while Kevlar can absorb up to 80 joules per gram. Researchers hope the structures will one day form material that can reinforce itself at points of high stress and could potentially be used in military airplanes or other defense applications. [TECHNICAL ARTICLE](#)

Tags: *Advanced materials, Military technology*

Smart materials become 'alive' with living bacteria in supramolecular assemblies

Nanowerk, 26MAR2015

Researchers in the Netherlands explored the possibility of developing a bacterial strain with the ability to interact dynamically with a popular supramolecular building-block, a pumpkin-shaped hollow molecule named Cucurbit[8]uril (CB[8]). They were able to show that living cells can also be used as a component in supramolecular smart materials. Their novel strategy introduces specific, dynamic and reversible supramolecular functionality on the bacterial cell surface. [TECHNICAL ARTICLE](#)

Tags: *Advanced materials*

AUTONOMOUS SYSTEMS & ROBOTICS

Video Friday: Chameleon Gripper, Swarmie Robots, and Superman With GoPro

IEEE Spectrum, 27MAR2015

The Mojave Volatiles Prospector, or MVP project, is a test bed for scientists from Ames to develop the technologies and procedures that will be needed to search for water, ice and other volatiles that might be hidden under the surface of the Moon, Mars or another planetary body.

Tags: *Autonomous systems & robotics*

BIOTECHNOLOGY

Thin transparent flexible screens: Roll up your screen and stow it away?

Science Daily, 30MAR2015

Researchers in Israel suggest that a novel DNA-peptide structure can be used to produce thin, transparent, and flexible screens. They harnessed bionanotechnology to emit a full range of colors in one pliable pixel layer -- as opposed to the several rigid layers that constitute today's screens. The new material is light, flexible, organic, and environmentally friendly. A single layer emits the same range of light that requires several layers today.

[TECHNICAL ARTICLE](#)

Tags: *Biotechnology, Information technology*

CYBER SECURITY

New technology to help users combat mobile malware attacks

PhysOrg.com, 27MAR2015

Researchers at the University of Alabama explain how natural hand gestures associated with three primary smartphone services—calling, snapping and tapping—can be detected and have the ability to withstand attacks. If a human user attempts to access a service, the gesture would be present and access will be allowed. In contrast, if the malware program makes an access request, the gesture will be missing and access will be blocked.

Tags: *Cyber security*

Novel graph method detects cyber-attack patterns in complex computing networks

PhysOrg.com, 27MAR2015

A team of researchers in the US (Pacific Northwest National Laboratory, Washington State University) devised a novel framework called StreamWorks that categorizes cyber attacks as graph patterns. The patterns can be examined using a continuous query on a single, large streaming dynamic graph. "Continuous Query" focuses on finding matches for queries in a data stream as soon as they happen, in contrast to ad hoc querying supported by databases.

Tags: *Cyber security, Government S&T*

“Technology is so much fun but we can drown in our technology.

The fog of information can drive out knowledge.” DANIEL J. BOORSTIN

Quantum compute this: Mathematicians build code to take on toughest of cyber attacks

Science Daily, 26MAR2015

To bring the old cipher called the knapsack code up to quantum level, researchers at Washington State University engineered new numbering systems for the code using high-level number theory and cryptography. They created new digital systems with much greater complexity than the day-to-day decimal and binary systems. By using very complicated number strings, they produced a new version of the knapsack code that can't be broken by the usual cyber attack methods. They believe the redesigned knapsack code could offer a viable alternative for public key encryption with quantum computing. [TECHNICAL ARTICLE](#)

Tags: Cyber security, Quantum science

ENERGY

Study identifies the challenges facing large-scale deployment of solar photovoltaics

PhysOrg.com, 27MAR2015

Worldwide installed solar photovoltaics capacity and has seen sustained growth averaging 43 percent per year since 2000. To evaluate the prospects for sustaining such growth, MIT researchers look at possible constraints on materials availability and propose a system for evaluating the many competing approaches to improved solar-cell performance. [TECHNICAL ARTICLE](#)

Tags: Energy, Solar energy

Copper atoms bring a potential new battery material to life

PhysOrg.com, 26MAR2015

Researchers at DOE's Brookhaven National Laboratory report that adding copper atoms to iron fluoride produces a group of new fluoride materials that can reversibly store lithium ions, and can store three times as many as conventional cathode materials. Measurements indicate that these new materials could yield a cathode that is extremely energy-efficient. [TECHNICAL ARTICLE 1, 2](#)

Tags: Energy, Government S&T

FORECASTING

The Multiple Lives of Moore's Law

IEEE Spectrum, 30MAR2015

Moore's prediction may have started out as a fairly simple observation of a young industry. But over time

it became an expectation and self-fulfilling prophecy. Moore's Law is not one simple concept. Its meaning has changed repeatedly over the years, and it's changing even now. If we're going to draw any lessons from Moore's Law about the nature of progress and what it can tell us about the future, we have to take a deeper look.

Tags: Forecasting, Science without borders

Future Vision - Emerging Technologies and Their Transformational Potential on the Energy Industry

NASA STI, 27MAR2015

At the SPIE Digital Energy meeting (3-5 Mar. 2015; The Woodlands, TX) a panel of innovative visionary leaders from inside and outside the energy industry will discuss the emerging technologies that will shape the future of industrial operations over the next decade. To look that far ahead, we need to broadly consider how artificial intelligence, robotics, big data, nanotechnology, internet-of-things and other rapidly evolving and interrelated technologies will shape mankind's future.

Tags: Forecasting, Emerging technology, NASA

GOVERNMENT S&T

DARPA Shares Its Vision for the Future

DARPA News, 26MAR2015

DARPA has released "Breakthrough Technologies for National Security", a biennial report summarizing the Agency's historical mission, current and evolving focus areas and recent transitions of DARPA-developed technologies to the military Services and other sectors. [REPORT](#)

Tags: Government S&T, DARPA

IMAGING TECHNOLOGY

New sensor design reveals path to innovative imaging technologies

PhysOrg.com, 27MAR2015

The image sensor, developed by researchers in Australia, uses organic plastic semiconductors, rather than conventional inorganic silicon semiconductors to absorb light. Key to the technology is that it eliminates the need for a colour filter system. The invention brings technology closer to designing a seamlessly-integrated and more affordable image sensor that would recognise colours much like the human eye does. [TECHNICAL ARTICLE](#)

Tags: Imaging technology, S&T Australia, Sensors

INFORMATION TECHNOLOGY

Storage Breakthrough Will Improve SSD Capacity Tenfold[Wired, 27MAR2015](#)

Two companies announced new 3D NAND technology that stacks layers of flash cells vertically to increase density. The net result is that 2.5-inch SSDs could come in 10TB capacities, compared to the 1TB drives most laptops max out at today. The smaller SSDs required for the super-skinny laptops of the world won't see quite as much of a gain, but could still see a jump to 3.5TB.

Tags: Information Technology

FEATURED RESOURCE

Nanotechweb.org

As a global portal for the nanotechnology community, it provides news, an events calendar, product information, jobs and a free weekly news alert highlighting key research worldwide. [RSS](#)

MATERIALS SCIENCE

Turning back time by controlling magnetic interactions[PhysOrg.com, 30MAR2015](#)

Macroscopic magnetic properties emerge when microscopically small magnets align in a fixed pattern throughout the whole solid. Researchers in Germany have predicted that the interactions causing this alignment can be changed almost instantaneously and reversibly under the influence of a laser pulse. The finding implies the highly counterintuitive consequence that magnetic dynamics can effectively run backwards in time under the influence of a sufficiently strong time-periodic laser field.

[TECHNICAL ARTICLE](#)

Tags: Materials science, S&T Germany

MICROELECTRONICS

New process could make gallium arsenide cheaper for computer chips, solar cells[PhysOrg.com, 25MAR2015](#)

Researchers at Stanford University have developed a technique to make a gallium arsenide wafer reusable. They covered the wafer with a layer of disposable material, and used gas deposition process to form a gallium arsenide circuit layer on top of the disposable layer. Using a laser, they vaporized the disposable layer, lifted off the circuitry layer and mounted it on a more solid backing. The gallium arsenide wafer was cleaned for reuse. [TECHNICAL ARTICLE](#)

Tags: Microelectronics, Advanced manufacturing

NEUROSCIENCE

When attention is a deficit: How the brain switches strategies to find better solutions (Neuron)[Princeton University, 27MAR2015](#)

Sometimes being too focused on a task is not a good thing. An international team of researchers led by Princeton University (USA, Germany, Italy) found that activity in the medial prefrontal cortex was involved in monitoring what is happening outside one's current focus of attention and shifting focus from a successful strategy to one that is even better. [TECHNICAL ARTICLE](#)

Tags: Neuroscience

PHOTONICS

Faraday Discussions 4: Using biomaterials for photonics (w/video)[Nanotechweb, 27MAR2015](#)

To celebrate the International Year of Light, nanotechweb.org will be highlighting some of the most exciting research in the fast-moving field of nanophotonics. The Royal Society of Chemistry organized a series of conferences that exploits an interactive panel format to foster discussion around a particular research theme. In this particular event, some of the attendees share their enthusiasm for understanding how light interacts with materials at the nanoscale. More interviews with researchers at the Faraday Discussions are available on the [YouTube playlist](#).

Tags: Photonics

QUANTUM SCIENCE

Fascinating quantum transport on a surface[Nanowerk, 30MAR2015](#)

A topological insulator's interior acts as an insulator, but the surface conducts electricity extremely well. Researchers in Germany have measured it with extremely high temporal resolution and at room temperature. In addition, they were able to influence the direction of the surface currents with a polarized laser beam. [TECHNICAL ARTICLE](#)

Tags: Quantum science, Advanced materials, S&T Germany

Next important step toward quantum computer[Science Daily, 30MAR2015](#)

An international team of researchers (UK, Germany, France) has succeeded in linking two completely different quantum systems to each other. They created a hybrid system combining the speed of quantum dots and the ions to store the direction of polarization. [TECHNICAL ARTICLE](#)

Tags: Quantum science

Quantum computers could greatly accelerate machine learning

PhysOrg.com, 30MAR2015

Researchers in China have performed machine learning on a photonic quantum computer, demonstrating that quantum computers may be able to exponentially speed up the rate at which certain machine learning tasks are performed, in some cases reducing the time from hundreds of thousands of years to mere seconds. Quantum entanglement provides a very fast way to classify vectors into one of two categories, a task that is at the core of machine learning. [TECHNICAL ARTICLE](#)

Tags: Quantum science, S&T China

Deeper understanding of quantum fluctuations in 'frustrated' layered magnetic crystals

PhysOrg.com, 27MAR2015

Researchers in Japan have uncovered evidence of a weak force in a quantum simulator prototype that can answer questions about phase transitions involving Heisenberg's uncertainty principle. The scientists believe that their results could be useful for measuring the 'critical exponents' that define the behavior of substances such as supersolids. [TECHNICAL ARTICLE](#)

Tags: Quantum science, S&T Japan

How to Stop a Nanosphere

American Physical Society Spotlight, 27MAR2015

To study quantum physics of macroscopic objects, like nanoscale glass beads, most of the random thermal motion should be eliminated. Researchers in the UK have developed a technique combining a charged-particle trap and an optical cavity to reduce the motion enough to use a nanosphere to test quantum mechanics, as well as make highly sensitive measurements of gravity. The work constitutes a significant milestone in optomechanics and laser cooling. [TECHNICAL ARTICLE](#)

Tags: Quantum science

Understanding spectral properties of broadband biphotons

PhysOrg.com, 26MAR2015

Researchers in Japan generated broadband biphotons (quantum entangled photons) with a spectral width of over 40 nanometers by shining a strong laser pulse beam through a PPMgSLT crystal. Their tests showed that the spectral properties of biphotons appeared to be mainly determined by the spectral properties of the chosen laser pulse. The team hopes that properties of biphotons could be deliberately controlled to improve optical fields for future quantum information and communication technologies. [TECHNICAL ARTICLE](#)

Tags: Quantum science, S&T Japan

SCIENCE WITHOUT BORDERS

Hoax-detecting software spots fake papers

Science Magazine, 27MAR2015

Researchers at MIT created a program to generate nonsensical computer science research papers to expose the lack of peer review at low-quality conferences that essentially scam researchers with publication and conference fees. Academic publisher Springer is releasing SciDetect this week, an open-source program to automatically detect automatically generated papers.

Tags: Science without borders ■

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