Volume 4, Issue 13 ■ 28MAR2014

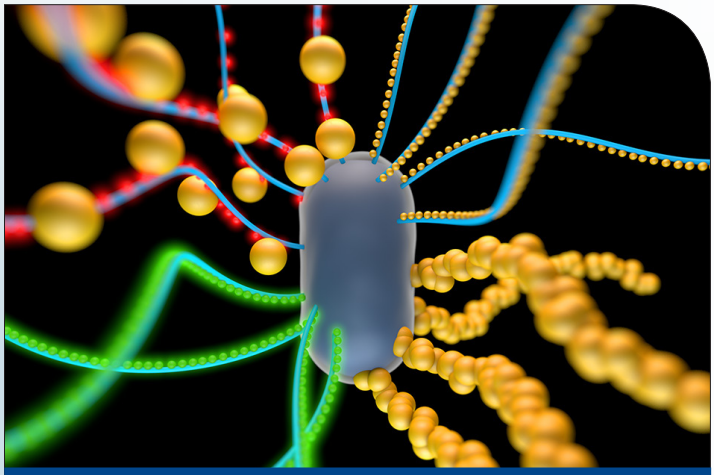
S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

FEATURE ARTICLES

Engineers design 'living materials'

MIT News, 23MAR2014



An artist's rendering of a bacterial cell engineered to produce amyloid nanofibers that incorporate particles such as quantum dots (red and green spheres) or gold nanoparticles. IMAGE: YAN LIANG

Researchers at MIT have coaxed bacterial cells to produce biofilms that can incorporate nonliving materials, such as gold nanoparticles and quantum dots. They combine the advantages of live cells, which respond to their environment, produce complex biological molecules, and span multiple length scales, with the benefits of nonliving materials, which add functions such as conducting electricity or emitting light. TECHNICAL ARTICLE

Tags: Biotechnology, Featured Article

Experiment opens the door to multi-party quantum communication

Science Daily, 23MAR2014

Researchers in Canada have demonstrated the distribution of three entangled photons at three different locations (Alice, Bob and Charlie) several hundreds of meters apart, proving quantum nonlocality for more than two entangled photons. TECHNICAL ARTICLE

Tags: Communications Technology, Quantum science, S&T Canada, Featured Article

S&T NEWS ARTICLES

ADVANCED MATERIALS

Hunt for an 'unidentified electron object'

PhysOrg.com, 25MAR2014

An international team of researchers (UK, Russia, France) led by the UK has developed a new mathematical framework capable of describing motions in superfluids. It sheds light on the nature of 'unidentified electron objects'—a mysterious class of objects that exists in superfluid helium at low temperature. TECHNICAL ARTICLE

Tags: Advanced materials, Particle physics

Scientists develop silicon cells capable of absorbing infrared radiation from the sun (w/video)

Nanowerk, 25MAR2014

Researchers in Spain have created photovoltaic cells on silicon micrometre scale sphere, where infrared light is trapped. The cells spin until infrared light is turned into electricity. TECHNICAL ARTICLE

Tags: Advanced materials, Materials science, Solar energy

Researchers grow carbon nanofibers using ambient air, without toxic ammonia

Science Daily, 24MAR2014

Researchers at North Carolina State University have demonstrated that vertically aligned carbon nanofibers can be manufactured using ambient air, making the manufacturing process safer and less expensive. They hold promise for use in gene-delivery tools, sensors, batteries and other technologies. TECHNICAL ARTICLE

Tags: Advanced materials

Discovery of new semiconductor holds promise for 2D physics and electronics

Nanowerk, 20MAR2014

Researchers at the University of California, Berkeley have discovered rhenium disulfide, a two-dimensional semiconductor. Unlike molybdenum disulfide and other dichalcogenides, rhenium disulfide behaves electronically as if it were a 2D monolayer even as a 3D bulk material.

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This opens the door to 2D electronic applications with a 3D material. TECHNICAL ARTICLE

Tags: Advanced materials

High-Strengh Materials from the Pressure Cooker

Alphagalileo, 18MAR2014

Researchers in Austria found out that under seemingly hostile conditions, organic materials with remarkable material properties can be synthesized—for instance Kevlar. The high temperature and high pressure process is faster, better and more eco-friendly than other techniques.

Tags: Advanced materials, Materials science

AUTONOMOUS SYSTEMS & ROBOTICS

Video Friday: Morphing Hexapod, Swarming Roboroaches, and Suitable Snowden

IEEE Spectrum, 21MAR2014

Are you ready to be swarmed by robot insects? Time to DASH!

Tags: Autonomous systems & robotics

COMMUNICATIONS TECHNOLOGY

Spintronics: Could diamonds be a computer's best friend?

Science Daily, 23MAR2014

In a new experiment, researchers at Ohio State University have demonstrated that diamond transmits spin better than most metals in which researchers have previously observed the effect. Spin could one day be used to transmit data in computer circuits. TECHNICAL ARTICLE

Tags: Communications Technology

The future of satellites: What are the options?

Defense Systems, 21MAR2014

DOD is exploring a range of cost-cutting options for satellite communications that includes making technical changes, altering management strategies and using new launch techniques.

Tags: Communications Technology, S&T Policy, Satellite technology

ENERGY

Scientists discover material that can be solar cell by day, light panel by night

Science Daily, 24MAR2014

Researchers in Singapore have developed a next-generation solar cell material from Perovskite that can emit light, in addition to converting light to electricity. The new cells not only glow when electricity passes through them, but they can also be customized to emit different colors. TECHNICAL ARTICLE

Tags: Energy, Advanced materials, Solar energy

Stretchable energy storage and conversion

Nanowerk, 20MAR2014

In a recent review in Small Stretchable Energy Storage and Conversion Devices, researchers in Singapore, summarize the recent progress in the developments of stretchable power sources including supercapacitors, batteries and solar cells.

Tags: Energy

ENVIRONMENTAL SCIENCE

Seismic cloak could minimize earthquake damage

Physics World, 25MAR2014

Researchers in France have taken a different approach that involves modifying the ground around a building to divert seismic waves, effectively cloaking the structure from an earthquake's destructive energy. They have conducted preliminary field tests on the efficacy of the design.

Tags: Environmental science

INFORMATION TECHNOLOGY

The latest in Chinese IT

Federal Computer Week, 26MAR2014

When most people think of Chinese IT applications, they think—as is the case for Chinese products in many areas—of knockoffs. This has begun to change, however, in terms of both actual technology and the role homegrown tech is playing in society and everyday life in China.

Tags: Information Technology, S&T China

Parallel programming may not be so daunting

MIT News, 23MAR2014

Researchers at MIT demonstrate a new analytic technique suggesting that, in a wide range of real-world cases, lock-free algorithms actually give wait-free performance. The researchers' key insight was that the chip's performance as a whole could be characterized more simply than the performance of the individual cores. That's because the allocation of different "threads," or chunks of code executed in parallel, is symmetric.

Tags: Information Technology

Magnetic twins are more efficient

RIKEN Research, 20MAR2014

Skyrmions—nanoscale vortices in the magnetic moment, or 'spin', of a material holds much potential for the next generation of high-density data storage. Researchers in Japan have reported the first experimental observation of bound pairs of skyrmions. Pairs of nanoscale magnetic vortices could ultimately lead to more efficient memory devices. TECHNICAL ARTICLE

Tags: Information Technology, Materials science, S&T Japan

continued...

"The only way of discovering the limits of the possible is to venture a little way past them into the impossible." ARTHUR C. CLARKE

The Last 20 Inches: Data's Treacherous Journey from the Screen to the Mind

MIT Technology Review, 19MAR2014

Data is crucial to our lives, but it can be hard to make sense of. That's what makes these visualization tools potentially transformative. In a world where bits travel at thousands of miles per second, the last 20 inches of the journey—those separating the screen from the user—are where communication stops.

Tags: Information Technology

MATERIALS SCIENCE

Graphene Helps Copper Wires Keep Their Cool

MIT Technology Review, 21MAR2014

An international team of researchers (USA, UK) report that a sandwich made of graphene on both sides of a sheet of copper improves the copper's ability to dissipate heat by 25 percent—a significant figure for chip designers. Graphene itself doesn't seem to conduct the heat away. Rather, it alters the structure of the copper, improving the metal's conductive properties. TECHNICAL ARTICLE

Tags: Materials science, Advanced materials

Nanocoating for aircraft engines may triple service life and reduce fuel consumption

Nanowerk, 20MAR2014

Researchers in Sweden have started using nanoparticles in the heat-insulating surface layer that protects aircraft engines from heat. In tests, this increased the service life of the coating by 300%. They have used different materials in their work.

Tags: Materials science, S&T Sweden

Pseudogap theory puts physicists closer to high temperature superconductors

EurekAlert, 20MAR2014

A team of researchers from Canada and the USA have developed a model in which classical fluctuations of a six-component order parameter, encompassing both superconducting and charge orders, reproduce the characteristic concave temperature dependence of the x-ray scattering intensity and thus provide a framework for the understanding of the pseudogap regime. TECHNICAL ARTICLE

Tags: Materials science, Advanced materials

Magnetic behavior discovery could advance nuclear fusion

e! Science News, 19MAR2014

Inspired by the space physics behind solar flares and the aurora, a team of researchers from the University of Michigan and Princeton University has uncovered a new kind of magnetic behavior that could help make nuclear fusion reactions easier to start. TECHNICAL ARTICLE

Tags: Materials science, Nuclear energy

Thermal conductance can be controlled like waves using nanostructures

Science Daily, 19MAR2014

For the first time, researchers in Finland have demonstrated that it is possible to change the thermal conductance of a material by tuning the wave-like properties of heat flow, by orders of magnitude, using nanostructuring. At low temperatures, there are direct applications in the development of ultrasensitive radiation detectors, where the control of heat transport is essential. TECHNICAL ARTICLE

Tags: Materials science, S&T Finland

MICROELECTRONICS

Mixing light and electricity for innovative electronics

EU Research, 25MAR2014

EU-funded scientists are now looking at light as a replacement for electric signals. In their search for smaller, faster, low-energy alternatives, they are reporting promising work on light particles called 'polaritons', paving the way for next-generation circuits for use in devices such as computers and smartphones.

Tags: Microelectronics, S&T EU

Tiny transistors for extreme environs: Engineers shrink plasma devices to resist radiation

Science Daily, 20MAR2014

The new devices designed by researchers at the University of Utah are the smallest microscale plasma transistors to date. They measure 1 to 6 microns in length, or as much as 500 times smaller than current state-of-the-art microplasma devices, and operate at one-sixth the voltage. They can operate at temperatures up to 1,450 degrees Fahrenheit. TECHNICAL ARTICLE

Tags: Microelectronics

continued...

NEUROSCIENCE

Electric 'thinking cap' controls learning speed

Science Daily, 23MAR2014

Researchers at Vanderbilt University have shown that it is possible to selectively manipulate our ability to learn through the application of a mild electrical current to the brain, and that this effect can be enhanced or depressed depending on the direction of the current. TECHNICAL ARTICLE

Tags: Neuroscience

Featured Resource

Nature Physical Sciences Research

Nature provides its latest table of contents as an RSS web feed, so you can get the world's best science delivered straight to your desktop. RSS

PHOTONICS

Asymmetric light propagation based on semi-circular photonic crystals

IOP Science, 23MAR2014

Researchers in China propose a semi-circular photonic crystal structure which allows light from one direction to transfer to the other side, but not in the opposite direction. A high contrast ratio is obtained by designing the constitutive parameters of the photonic crystal and choosing the suitable light frequency. This structure promises a significant potential in optical integration and other areas.

Tags: Photonics, S&T China

A fully photonics-based coherent radar system

Nature, 19MAR2014

Researchers in Italy present the development and the field trial results of a fully photonics-based coherent radar demonstrator carried out within the project PHODIR. The proposed architecture exploits a single pulsed laser for generating tunable radar signals and receiving their echoes, avoiding radio-frequency up- and downconversion and guaranteeing both the software-defined approach and high resolution.

Tags: Photonics, S&T Italy

QUANTUM SCIENCE

Einstein's 'spooky' theory may lead to ultra-secure Internet

Science Daily, 24MAR2014

An international team of researchers (Australia, China) led by Australia give theoretical proof that entangled messages can be shared between more than two people and may provide unprecedented security for a future quantum Internet. TECHNICAL ARTICLE

Tags: Quantum science

Unraveling a quantum phase transition

RIKEN Research, 20MAR2014

Researchers in Japan have computationally uncovered 'tricritical' transition points that help explain the quantum phase transition in superfluid-to-insulator systems. The insight offered by the discovery could eventually prove invaluable for future applications of quantum processes, such as in quantum computing. TECHNICAL ARTICLE

Tags: Quantum science, S&T Japan

SCIENCE WITHOUT BORDERS

China to build a huge underground neutrino experiment

Physics World, 24MAR2014

When completed in 2020, JUNO (Jiangmen Underground Neutrino Observatory) is expected to run for more than 20 years, studying the relationship between the three types of neutrino: electron, muon and tau. The detector is expected to have an energy resolution of around 3%.

Tags: Science without borders, Particle physics, S&T China

Now even more likely that there are particles smaller than Higgs out there

Science Daily, 21MAR2014

Theories predict the existence of particles that are smaller than the Higgs particle. The most important of these theories have been critically tested by researches in Denmark. The result: The existence of the yet unseen particles is now more likely than ever. TECHNICAL ARTICLE

Tags: Science without borders, Particle physics

Business: Why innovation takes a nosedive

Science Daily, 18MAR2014

A paper by a business school in Canada shows that leaders tend to pursue innovations, even as complex as airplanes, based on early adoption by competitors not close scrutiny of the technical merits. TECHNICAL ARTICLE

Tags: Science without borders

continued...

Telescope captures view of gravitational waves

Nature News, 17MAR2014

Using a radio telescope at the South Pole, the US-led team has detected the first evidence of primordial gravitational waves, ripples in space that inflation generated 13.8 billion years ago when the Universe first started to expand. The telescope captured a snapshot of the waves as they continued to ripple through the Universe some 380,000 years later.

Tags: Science without borders

Silicon Valley's Youth Problem

New York Times, 16MAR2014

In start-up land, the young barely talk to the old (and vice versa). That makes for a lot of cool apps. But great technology? Not so much. In pursuing the latest and the coolest, young engineers ignore opportunities in less-sexy areas of tech like semiconductors, data storage and networking, the products that form the foundation on which all of Web 2.0 rests.

Tags: Science without borders

SENSORS

Small, deep-UV lasers could detect biological and chemical agents on the battlefield

Defense Systems, 24MAR2014

The goal of the LUSTER project, sponsored by DARPA, is to develop UV lasers that are more than 300 times smaller than current generation lasers and 10 times more efficient. These lasers would then be integrated into current and future detection sensors.

Tags: Sensors, Government S&T

New infrared technique aims to remotely detect dangerous materials

Science Daily, 21MAR2014

The technique developed by researchers at Brigham Young University directly separates the incoming signals to provide the material's unique signature for each pixel of the image. The resulting information is more akin to measuring the material with a spectrometer in a lab.

TECHNICAL ARTICLE

Tags: Sensors ■

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