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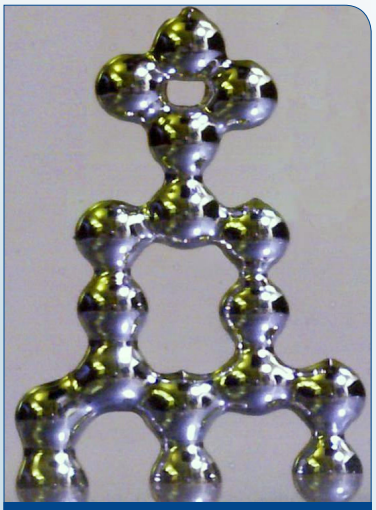
S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

Feature Articles

3-D Structures Built out of Liquid Metal

Science Daily, 09JUL2013



Researchers have developed three-dimensional structures out of liquid metal. (Credit: Michael Dickey)

Researchers at North Carolina State University have developed three-dimensional (3-D) printing technology and techniques to create free-standing structures made of liquid metal at room temperature which can be used to connect electronic components in three dimensions. While it is relatively straightforward to pattern the metal "in plane," these liquid metal structures can also form shapes that reach up or down. TECHNICAL ARTICLE

Tags: Advanced manufacturing, Featured Article

Researchers build an all-optical transistor

Nanowerk, 05JUL2013

Researchers at MIT, Harvard University and the Vienna University of Technology describe the experimental realization of an optical switch that's controlled by a single photon, allowing light to govern the transmission of light. As such, it's the optical analog of a transistor, the fundamental component of a computing circuit. TECHNICAL ARTICLE

Tags: Communications Technology, Featured Article

Training intelligent systems to think on their own

PhysOrg.com, 01JUL2013

Researchers at the Georgia Institute of Technology working in the new field of goal-driven autonomy (GDA), are developing autonomous agents that dynamically identify and self-select their goals. A GDA agent follows a basic cycle. It has an expectation of something that will happen in an environment. When it detects an unexpected phenomenon, it attempts to explain the discrepancy between what it expected and what is actually happening. It is constantly checking when expectations are satisfied and when they are not, developing explanations for discrepancies and forming new goals to achieve them.

Tags: Autonomous systems & robotics, Featured Article

S&T News Articles

ADVANCED MANUFACTURING

Flat-pack structures build themselves

Harvard University, 03JUL2013

Scientists in the US have developed flat pack structures that can autonomously assemble into three-dimensional shapes on application of an electrical current. Unlike traditional three-dimensional assembly techniques, which require sophisticated printers to reach the final product, this approach uses heat triggered shape memory polymers.

Tags: Advanced manufacturing

ADVANCED MATERIALS

Graphene Provides Efficient Electronics Cooling

Science Daily, 03JUL2013

An international group of researchers, headed by Chalmers University of Technology in Sweden, are the first in the world to show that graphene has a heat dissipating effect on silicon based electronics. A layer of graphene can reduce the working temperature in hotspots inside a processor by up to 25 percent—which can significantly extend the working life of computers and other electronics. TECHNICAL ARTICLE

Tags: Advanced materials, Materials science, S&T Sweden

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Material scientists reveal organizing principles for design of nanomaterials

Nanowerk, 03JUL2013

Cluster-assembled materials are solids that are constructed from clusters—small nanoparticles of a few to a few dozen atoms. By fabricating these materials with different links, the assembly can be made into separated clusters, chains of clusters, sheets of clusters and three-dimensional lattices of clusters. By changing these linkers, the lowest energy color of light the material can absorb may be changed from deep in the infrared to green. TECHNICAL ARTICLE

Tags: Advanced materials

Superconductor Created from Solvent

Science Daily, 01JUL2013

A study led by Washington State University researchers has turned a fairly common non-metallic solvent into a superconductor capable of transmitting electrical current with none of the resistance seen in conventional conductors. TECHNICAL ARTICLE

Tags: Advanced materials, Materials science

COMMUNICATIONS TECHNOLOGY

'Fast, cheap' Internet satellites launched

PhysOrg.com, 25JUN2013

The orbiters, part of a project dubbed O3b, for the "other 3 billion" people with restricted Internet access, were lifted by a Russian Soyuz rocket from Kourou in French Guiana. The new satellites, built by the Franco-Italian company Thales Alenia Space, will orbit at 8,062 km and will weigh only 650 kilogrammes (1,400 pounds) each. The constellation will provide affordable, high-speed Internet to people in nearly 180 "under-connected" countries.

Tags: Communications Technology

CYBER SECURITY

'Master key' to Android phones uncovered

BBC News, 04JUL2013

A "master key" that could give cyber-thieves unfettered access to almost any Android phone has been discovered by security research firm BlueBox. The bug could be exploited to let an attacker do what they want to a phone including stealing data, eavesdropping or using it to send junk messages. The loophole has been present in every version of the Android operating system released since 2009.

Tags: Cyber security, Information technology

New Hardware Design Protects Data in the Cloud

Science Daily, 02JUL2013

MIT researchers described a new type of secure hardware component, dubbed Ascend, that would disguise a server's memory-access patterns, making it impossible for an attacker to infer anything about the data being stored. Ascend also thwarts another type of attack, known as a timing attack, which attempts to infer information from the amount of time that computations take.

Tags: Cyber security

NIST Releases Draft Outline of Cybersecurity Framework for Critical Infrastructure

NIST News, 02JUL2013

The outline proposes a core structure for the framework and includes a user's guide and an executive overview that describes the purpose, need and application of the framework in business. Reflecting received comments that emphasized the importance of executive involvement in managing cyber risks; the framework is designed to help business leaders evaluate how prepared their organizations are to deal with cyber threats and their impacts. Cybersecurity Framework

Tags: Cyber security, S&T Policy

ENERGY

New System to Harness Energy from Ocean Currents

Science Daily, 03JUL2013

Researchers in Malaysia are testing the prototype of a device to harness energy from ocean currents able to work in deep water. The main unit of the prototype includes a structure of stainless steel with a central body and three peripheral parts joined by arms. The generator, the multiplier, and the instrumentation system are inside while the rotor that captures ocean currents is outside.

Tags: Energy

New material can store large amounts of energy with very little energy loss

Nanowerk, 02JUL2013

The new metal oxide dielectric material developed by researchers in Australia outperforms current capacitors in many aspects, storing large amounts of energy and working reliably from -190°C to 180°C, and is cheaper to manufacture than current components.

Tags: Energy, Advanced materials

ENVIRONMENTAL SCIENCE

Matter-Antimatter Asymmetry: Using the Sun to Illuminate a Basic Mystery of Matter

Science Daily, 08JUL2013

Researchers at the New Jersey Institute of Technology have detected antimatter in solar flares via microwave and magnetic-field data. The results of this research have far-reaching implications for gaining valuable knowledge through remote detection of relativistic antiparticles at the Sun and, potentially, other astrophysical objects by means of radio-telescope observations.

Tags: Environmental science, Astronomy

continued...

"Engineering or technology is the making of things that did not previously exist, whereas science is the discovering of things that have long existed." DAVID BILLINGTON

IMAGING TECHNOLOGY

New Adaptive Optics System GeMS Delivers Sharper Images of the Universe

Science Daily, 03JUL2013

A new adaptive optics system, called GeMS , uses a combination of multiple lasers and deformable mirrors to remove atmospheric distortions from ground-based images, providing astronomers with ultrasharp data. The new images, as well as images of the system in operation in Chile, are available as high-resolution downloads with captions.

Tags: Imaging technology

INFORMATION TECHNOLOGY

Researchers develop world's first IaaS platform technology for on-demand physical servers

PhysOrg.com, 08JUL2013

Fujitsu Laboratories innovation, called "Resource Pool Architecture" makes it possible to configure physical servers on-demand and instantly respond to customer orders. This technology gives customers the ability to quickly bring high-performance physical servers online and instantly change hardware configurations, enabling greater flexibility in changing server numbers or the performance of individual servers to respond to changes in application loads.

Tags: Information Technology, Communications Technology, S&T Japan

Facial Analysis Software Spots Struggling Students

MIT Technology Review, 01JUL2013

Using software that had been trained to match facial expressions with different levels of engagement or frustration, researchers at North Carolina State University were able to recognize when students were experiencing difficulty and when they were finding the work too easy.

Tags: Information Technology

New algorithm quickly identifies most dangerous risks in a power grid amid millions or billions of possible failures

PhysOrg.com, 01JUL2013

To help prevent smaller incidents from snowballing into massive power failures, researchers at MIT have devised an algorithm that identifies the most dangerous pairs of failures among the millions of possible failures in a power grid. The algorithm "prunes" all the possible combinations down to the pairs most likely to cause widespread damage.

Tags: Information Technology, Mathematics

Teaching a Computer to Play Concentration Advances Security, Understanding of the Mind

Science Daily, 01JUL2013

Researchers at the University of North Carolina developed a program to get the software system called ACT-R, a computer simulation that attempts to replicate human thought processes, to play Concentration. The work could help improve computer security—and improve our understanding of how the human mind works.

Tags: Information Technology

Topological current for energy-saving devices

RIKEN Research, 21JUN2013

Personal computers soon become hot when in use due to the heat produced when current flows through devices with electrical resistance; its presence indicates that electric power is being wasted. Researchers in Japan have discovered that, theoretically, a 'topological current'—a type of electric current that does not generate heat—can flow through normal materials at room temperature. They aim to use topological current as the basis for new devices that require little electricity to work.

Tags: Information Technology, S&T Japan

MATERIALS SCIENCE

Champion nano-rust for producing solar hydrogen

Nanowerk, 07JUL2013

A team of researchers from Switzerland and Israel have managed to accurately characterize the iron oxide nanostructures to be used in order to produce hydrogen at the lowest possible cost. Their approach was to use an exceptionally abundant, stable and cheap material: rust.

TECHNICAL ARTICLE

Tags: Materials science, Energy

Designer droplets open new possibilities

Nanowerk, 06JUL2013

By designing droplets using electricity, researchers in Norway have opened new possibilities in physics. This technique could possibly be used for everything from extracting oil from wells to creating makeup and food.

TECHNICAL ARTICLE

Tags: Materials science

continued...

Antifreeze, Cheap Materials May Lead to Low-Cost Solar Energy

Science Daily, 04JUL2013

Engineers at Oregon State University have determined that ethylene glycol, commonly used in antifreeze products, can be a low-cost solvent that functions well in a "continuous flow" reactor—an approach to making thin-film solar cells that is easily scaled up for mass production at industrial levels. TECHNICAL ARTICLE

Tags: Materials science

Nanoparticles, made to order—inside and out

MIT News, 02JUL2013

A new coating technology developed at MIT, combined with a novel nanoparticle-manufacturing technology developed at the University of North Carolina may offer scientists a way to quickly mass-produce tailored nanoparticles that are specially coated for specific applications, including medicines and electronics. TECHNICAL ARTICLE

Tags: Materials science, Nanotechnology

Diamond catalyst shows promise in breaching age-old barrier

e! Science News, 30JUN2013

Researchers at UW-Madison turned to synthetic industrial diamond—a cheap, gritty, versatile material—as a potential new catalyst for reducing nitrogen to ammonia. Diamond, the Wisconsin team found, can facilitate the reduction of nitrogen to ammonia under ambient temperatures and pressures.

Tags: Materials science

New Low-Cost, Transparent Electrodes

Science Daily, 27JUN2013

Researchers at Arizona State University report creating a sturdy, transparent, and indium-free electrode from silver (Ag) and titanium dioxide (TiO_2) that could replace indium-based electrodes in some applications. TECHNICAL ARTICLE

Tags: Materials science

Featured Resource

arXiv

arXiv, started in 1994, is an e-print service in the fields of physics, mathematics, non-linear science, computer science, quantitative biology, quantitative finance and statistics. arXiv is owned and operated by Cornell University, funded by Cornell University Library and supporting user institutions. RSS

MICROELECTRONICS

Flash Memory: Silicon Oxide Memories Transcend a Hurdle

Science Daily, 09JUL2013

Researchers at Rice University have built a 1-kilobit rewritable silicon oxide device with diodes that eliminate data-corrupting crosstalk. The crossbar memories built by the Rice lab are flexible, resist heat and radiation and show promise for stacking in three-dimensional arrays. TECHNICAL ARTICLE

Tags: Microelectronics

An all-glass lab-on-a-chip

RIKEN Research, 05JUL2013

Researchers in Japan developed a teflon frame to hold an ultrathin sheet of glass so that it could be handled without breaking and incorporated the frame into an all-glass lab-on-a-chip. TECHNICAL ARTICLE

Tags: Microelectronics, S&T Japan

Microscopy technique could help computer industry develop 3-D components

e! Science News, 28JUN2013

Researchers at NIST have developed a technique, called Through-Focus Scanning Optical Microscopy (TSOM), which is able to detect tiny differences in the three-dimensional shapes of circuit components, which until very recently have been essentially two-dimensional objects.

Tags: Microelectronics, Government S&T

NEUROSCIENCE

Generating mind-controlled patterns in a fishbowl

KurzweilAI, 26JUN2013

Magnetic Mind translates brainwaves into kinetic art, using a NeuroSky MindWave brain-computer interface headset, an Arduino board, an electromagnet, and suspended ferrofluid (iron filings in water + alcohol). VIDEO

Tags: Neuroscience

QUANTUM SCIENCE

Detection of Single Photons Via Quantum Entanglement

Science Daily, 08JUL2013

Researchers in Austria isolated single ions in an ion trap to study them under controlled conditions. They do not try to detect the photon that is emitted or absorbed by an ion, but rather the momentum kick the ion receives upon absorption or emission. TECHNICAL ARTICLE

Tags: Quantum science, Photonics

continued...

Physicists Discover the Secret of Quantum Remote Control

MIT Technology Review, 02JUL2013

Researchers in Spain use the magnetic field in one region of space to continuously control the state of a particle somewhere else in space. They show how the ability to perform quantum operations continuously and deterministically can be leveraged for inducing non-local dynamics between two separate parties. TECHNICAL ARTICLE

Tags: Quantum science

SCIENCE WITHOUT BORDERS

2013 R&D 100 Awards Winners Announced

R&D Magazine, 08JUL2013

The editors of R&D Magazine have announced the winners of the 51st annual R&D 100 Awards, which recognize the 100 most technologically significant products introduced into the marketplace over the past year. The full list of this year's winners is now available: 2013 R&D 100 Awards winners.

Tags: Science without borders

Switzerland Still Considered Most Innovative

MIT Technology Review, 02JUL2013

The index ranks 142 world economies using 84 indicators seen as reflecting "innovation capabilities," as well as actual innovation. To gauge a country's capacity for invention, the authors consider variables like political stability, the availability of education, and regulatory environment. To measure output, they counted things like new patents, exports, and scientific and technical journal articles. 2013 Global Innovation Index

Tags: Science without borders

SENSORS

Molecular Chains Hypersensitive to Magnetic Fields

Science Newsline, 04JUL2013

Researchers in the Netherlands are the first to successfully create perfect one-dimensional molecular wires whose electrical conductivity can be suppressed by a weak magnetic field at room temperature. The underlying mechanism is possibly closely related to the biological compass used by some migratory birds to find their bearings in the geomagnetic field. This discovery may lead to radically new magnetic field sensors, for smartphones for example. TECHNICAL ARTICLE

Tags: Sensors

Creating smart fiber composites by embedding ultrathin RFID tags

KurzweilAI, 01JUL2013

Researchers in Germany have designed an ultra-thin antenna that can be embedded in materials underneath a protective glass fiber layer. They have already developed the first test series.

Tags: Sensors, S&T Germany ■

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