

Matériaux

Bulletin de Veille - 31 janvier 2019

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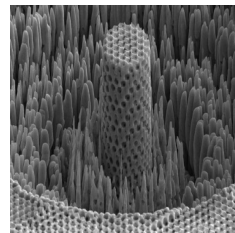
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GÉNÉRALITÉS - MATÉRIAUX

'Metallic wood' has the strength of titanium and the density of water

28/01/2019 - www.sciencedaily.com



An architect, working on the scale of individual atoms, could design and build new materials that have even better strength-to-weight ratios. And just as the porosity of wood grain serves the biological function of transporting energy, the empty space in the researchers' "metallic wood" could be infused with other materials. "The long-term interesting thing about this work is that we enable a material that has the same strength properties of other super high-strength materials but now it's 70 percent empty space," Pikul says.

Happy Sesquicentennial, Periodic Table!

22/01/2019 - blogs.scientificamerican.com



For example, the elements are no longer ordered according to atomic weight—the total of protons and neutrons in their atoms' nuclei—but instead according to increasing values of atomic number, which is the total of protons only. In order to search for other such materials scientists needed just to consult the periodic table in order to predict that compounds in which yttrium was replaced by lanthanum would also be high-temperature superconductors. .

Einstein-de Haas effect has a central role in ultrafast demagnetization processes

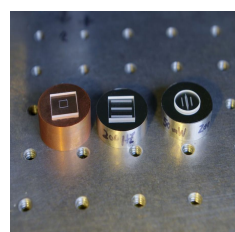
15/01/2019 - www.sciencedaily.com

The Einstein-de Haas effect, first demonstrated more than a century ago, provides an intriguing link between magnetism and rotation in ferromagnetic materials. Tracking the fate of the angular momentum is more tricky in the case of ultrafast demagnetization, in particular as the timescales involved are extremely short – in the past two decades, it has been shown for several metallic ferromagnets that exposure to intense laser pulses can induce a drop in magnetization within less than 100 femtoseconds. ...

AÉROSPATIAL

NASA Investigates Ultrafast Laser Machining for Spaceflight Applications

23/01/2019 - www.techbriefs.com



A Goddard team is using an ultrafast laser to bond dissimilar materials, with the goal of ultimately eliminating epoxies that outgas and contaminate sensitive spacecraft components. A team of optical physicists at NASA's Goddard Space Flight Center in Greenbelt, Maryland, is experimenting with a femtosecond laser and has already shown that it can effectively weld glass to copper, glass to glass, and drill hair-sized pinholes in different materials.

MATÉRIAUX POUR L'ÉNERGIE

as Surround™ EMI/RFI Shielding Formulations

- 2D magnetism reaches a new milestone

SEMI-CONDUCTEURS

- Scientists Explore a New Material Structure that May be Better Suited for Future Power Electronics

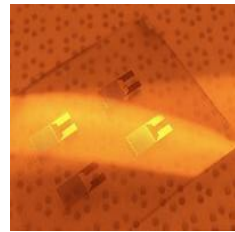
Scientists boost stability of low-cost, large-area solar modules

22/01/2019 - www.sciencedaily.com

The study, published online in *Advanced Functional Materials* on December 13, 2018, supports prior evidence that a commonly used material in PSCs, called titanium dioxide, degrades the devices and limits their lifetime. The researchers replaced this material with tin dioxide, a stronger conductor without these degrading properties. "Most PSCs employ titanium dioxide as their electron transport layer, but when exposed to sunlight, the material reacts with perovskite and ultimately degrades the device.

New thermoelectric material delivers record performance

22/01/2019 - www.spacedaily.com



The researchers measured the conversion efficiency of one compound at 11.4 percent - meaning the material produced 11.4 watts of electricity for every 100 watts of heat it took in. "The p-type TaFeSb-based half-Heusler, one of the compounds discovered in this work, demonstrated a very promising thermoelectric performance. ...

New catalysts for better fuel cells

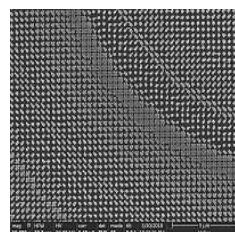
09/01/2019 - www.sciencedaily.com

The catalysts were nitrogen-doped carbon nanorods with ceria and cobalt nanoparticles on their surfaces; essentially carbon nanorods containing nitrogen, cobalt and ceria. The researchers conclude that ceria could be considered among the most promising materials for use with cobalt on nitrogen-doped carbon nanorods to produce stable catalysts with enhanced electrochemical activity in PEMFCs and related devices.

MATÉRIAUX POUR L'OPTIQUE

Broadband achromatic metalens focuses light regardless of polarization

23/01/2019 - www.spacedaily.com



In previous research, Capasso, Chen and their team demonstrated that arrays of titanium dioxide nanofins could equally focus wavelengths of light and eliminate chromatic aberration, but those lenses could only focus a circularly polarized light.

Next generation photonic memory devices are light-written, ultrafast and energy efficient

14/01/2019 - www.sciencedaily.com

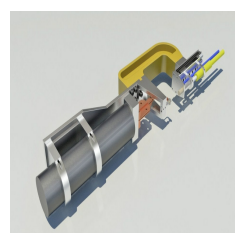


When all-optical switching was first observed in ferromagnetic materials -- amongst the most promising materials for magnetic memory devices -- this research field gained a great boost'. Laliou: "The switching of the magnetization direction using the single-pulse all-optical switching is in the order of picoseconds, which is about a 100 to 1000 times faster than what is possible with today's technology.

COLLAGES –ADHÉSIFS

Fraunhofer Scientists Develop Joining Gun that Quickly Bonds Metal And Thermoplastics

25/01/2019 - www.azom.com



A joining gun that forms a bond between metal and thermoplastic materials within a matter of few seconds has been created by the researchers at the Fraunhofer Institute for Material and Beam Technology IWS in Dresden. The joining gun bonds metal and plastic in seconds and can be mounted on a robot arm in place of a spot welding gun, for example. The joining gun incorporates the HeatPressCool-Integrative process, developed at the Fraunhofer IWS Dresden, allowing the direct and precise bonding between plastic and metal parts within seconds.

Highly Filled Adhesives Feature Good Dispensing Properties

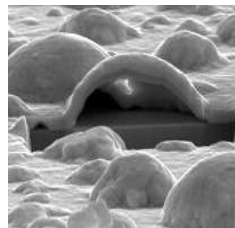
25/01/2019 - www.azom.com

Despite such potentially abrasive behavior, the adhesives can be dispensed reliably and precisely over the long term. This assumption has now been proved wrong by long-term tests. Initially, the stators were placed in adhesive for 168 hours to investigate their general chemical suitability for long-term contact. This test phase was succeeded by 24 long-term tests consisting in cyclic dispensing operations: two seconds of dispensing were followed by a one-second pause to simulate a typical dispensing behavior of automated manufacturing processes.

NANOMATÉRIAUX

Platinum forms nano-bubbles

27/01/2019 - www.nanodaily.com



Platinum, a noble metal, is oxidised more quickly than expected under conditions that are technologically relevant. The scientists studied a thin layer of platinum which had been applied to an yttria-stabilised zirconia crystal (YSZ crystal), the same combination that is used in the lambda sensor of automotive exhaust emission systems. The vapour-deposited layer of platinum serves as an electrode. They found that the inner surface of the bubbles was lined with a layer of platinum oxide which could be up to 85 nanometres thick, much thicker than expected.

New Nickel Mesoporous Film Structures Have 400 Times Greater Useful Surface Area than Solid Ones

24/01/2019 - www.azom.com

The structure of nanoporous materials is analogous to a typical sponge, which can hold considerable volumes of substance hence the useful surface area of the sponge is much greater than its size. Researchers have found out that when a specific concentration of surfactants (30 weight percent) is used, the nickel frame structure does not grow in a random manner, but grows in the form of hexagonally ordered nanotubes. FEFU has a priority research project "Materials", which is cooperated by a group of capable young chemists, physicists, materials scientists, and biologists.cobalt ...

POLYMÈRES - ÉLASTOMÈRES

New class of polyethylene catalyst

25/01/2019 - www.sciencedaily.com

A team of chemists from the University of Houston has reported the discovery of a new class of catalyst to produce ultra-high-weight polyethylene, a potential new source of high-strength, abrasion-resistant plastic used for products ranging from bulletproof vests to artificial joints. "This is a completely new class of catalysts that can produce ultra-high-weight polyethylene," said co-author Olafs Daugulis, Robert A. Welch Chair of Chemistry at UH.

Polyplastics Launches Alkali Stress Crack Resistant PBT Resin for Automotive Applications

24/01/2019 - www.azom.com

The Polyplastics Group has introduced a new polybutylene terephthalate (PBT) resin which delivers excellent alkali stress crack resistance for a range of automotive applications. Targeted Applications of Polyplastics' New DURANEX® 532AR PBT Resin The new grade, DURANEX® 532AR, also exhibits outstanding. Stress Cracking Resistance Properties in Alkali Environment. Outstanding Heat Shock Resistance to Withstand Harsh Conditions. Polyplastics' DURANEX® PBT Resin Range.

A Breakthrough in Biodegradable Plastics

21/01/2019 - www.azom.com

By controlling the chemistry, formulation and polymerization conditions, the polycarbonate materials created by Teysha's technology can be precisely tuned. By considering the ultimate fate of an applications material in the initial design stage, we can reduce the environmental impacts that occur from plastics, even those made by natural products, and stop contributing to the long-term accumulation of plastics in our oceans.

REVÊTEMENTS

PolyOne Rebrands ElectriPlast Tech. as Surround™ EMI/RFI Shielding Formulations

24/01/2019 - www.azom.com

- Integrated, long-fiber EMI/RFI shielding formulations – minimizes system damaging “cross talk” between electronic components - Lighter weight and easier to process than components made from aluminum and copper - Injection moldable material for thinner wall housings, without compromising on dimensional stability during demanding use - Increased design freedom enabling both complex shapes and smaller component housings - Durable and non-corrosive for long term usage - Customizable to application needs, including pre-coloring.

2D magnetism reaches a new milestone

22/01/2019 - www.sciencedaily.com

Researchers at the Center for Correlated Electron Systems, within the Institute for Basic Science (IBS) in South Korea, in collaboration with Sogang University and Seoul National University, reported the first experimental observation of a XY-type antiferromagnetic material, whose magnetic order becomes unstable when it is reduced to one-atom thickness. Among them, nickel phosphorus trisulfide (NiPS₃) corresponds to the of XY-type and is antiferromagnetic at low temperatures.

SEMI-CONDUCTEURS

Scientists Explore a New Material Structure that May be Better Suited for Future Power Electronics

22/01/2019 - www.azom.com



The recently launched project “Research of Functional Semiconductor Structures for Energy Efficient Power Electronics” studies the new semiconductor material scandium aluminum nitride (ScAlN). A new and different material known as scandium aluminum nitride (ScAlN) will be used for this purpose. Functional semiconductor structures based on materials with a large bandgap, such as scandium aluminum nitride and gallium nitride, allow for transistors with very high voltages and currents.

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