

Matériaux

Bulletin de Veille - 16 janvier 2019

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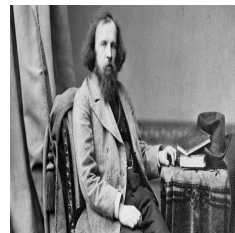
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GÉNÉRALITÉS - MATÉRIAUX

150 years ago, the periodic table began with one chemist's vision

08/01/2019 - www.sciencenews.org



Mendeleev had predicted an element (he called it eka-aluminum) with just that density and an atomic weight of 68. His predictions for eka-silicon closely matched germanium (discovered in 1886) in atomic weight (72 predicted, 72.3 observed) and density (5.5 versus 5.469). Atomic weight was closely related to Moseley's atomic number — close enough that ordering elements by weight differs in only a few spots from ordering by number.

DFM is a Path to Radical Profit Gains, not Just "Manufacturability"

08/01/2019 - www.azom.com

Both steel and two types of aluminum were reviewed, 6061-T6 aluminum for its role in forming stronger (yet more brittle) parts, and a 5052-grade aluminum for its flexibility and common use. The generic, all-carbon steel was passed by for its increased weight. Sitting together around the software, supplier and customer unpacked the process steps for all alternatives, costing them out in DFM after introducing individual supplier parameters such as machine availability, type and overhead, then seeing the results.

Powerful X-ray beams unlock secrets of nanoscale crystal formation

07/01/2019 - www.sciencedaily.com

The research provides the proof-of-principle for a new technique to study crystal formation in real-time, with potential applications for other materials, including alloys and oxides. The success with cobalt suggests the methodology could be used to produce nanometric phase diagrams for other materials, including more complex alloys and oxides, Chen said. "Our goal was to build a model and a systematic understanding about the formation of crystalline materials at the nanoscale," he said.

From playing cards to tectonic plates, layered materials pushed to the brink

02/01/2019 - www.sciencedaily.com

By studying the behavior of a deck of cards, and stacks of other materials, like steel and aluminum, scientists at Drexel University are proving the existence of a buckling phenomenon that happens inside layered materials when they are put under pressure. "The experiment we carried out is quite simple actually. But demonstrating the same behavior in layered materials that we can see directly, is an important step toward proving that the behavior happens in materials of all sizes.

NASA study finds sugars, key ingredient for life, can form in space

27/12/2018 - www.spacedaily.com

The basic idea of panspermia is that an impactor, like a comet or asteroid, crashes into world where life exists, blasting pieces of rock into space that carry the microbes and organic material to some other planet,

Future: CES 2019

- Low Viscosity, Thermally Conductive Underfill Epoxy

SEMI-CONDUCTEURS

- A major step closer to a viable recording material for future hard disk drives



where they eventually crash down when their rock becomes a meteor. "The [NASA] team suspects that these hydroxyl groups exist globally across the asteroid in water-bearing clay minerals, meaning that at some point, Bennu's rocky material interacted with water. .

New Materials Architectures Sought to Cool Hypersonic Vehicles

27/12/2018 - www.spacedaily.com



Dawn Aerospace, a New Zealand-Dutch startup building 100% reusable rockets for satellite delivery, has this week raised \$3.35m (NZD) of investment from Kiwi, American and Dutch investors. The money will be used to commercialise its world-leading satellite propulsion systems and begin development of its Mk-II Spaceplane. The company makes reusable rockets designed to carry small satellites into space.

MATÉRIAUX POUR L'ÉNERGIE

Researchers Produce Customized 3D-Printed Batteries for Small-Scale Wearable Electronic Devices

21/12/2018 - www.azom.com

The KAIST-Harvard research collaboration group has been successful in manufacturing different types of battery shapes, such as H, ring-type, and U shape, with the help of 3D printing technology. Zn-ion batteries employing aqueous electrolytes have the advantage of fabrication under ambient conditions, so it is easy to fabricate the customized battery packs using 3D printing. .

Freezing copper as a noble metal-like catalyst for preliminary hydrogenation

21/12/2018 - advances.sciencemag.org

For the AE-Cu/SiO₂ catalyst, the DMO hydrogenation as a tandem reaction first generate the partial hydrogenation product MG and immediately convert to EG at a low temperature range of 170° to 230°C. After those deep hydrogenation products, alcohols are generated at a high temperature above 230°C. With the temperature decreasing from 230° to 170°C, EG selectivity is gradually promoted with a maximum value of 96% at 240°C. But if the temperature further decreases to 175°C, then both EG selectivity and DMO conversion will quickly drop to 77 and 71%, respectively, in parallel with an enhanced MG...

MATÉRIAUX POUR L'OPTIQUE

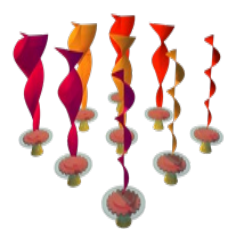
Physicists record 'lifetime' of graphene qubits

01/01/2019 - www.sciencedaily.com

The amount of time that these qubits stay in this superposition state is referred to as their "coherence time. " The longer the coherence time, the greater the ability for the qubit to compute complex problems. "Our motivation is to use the unique properties of graphene to improve the performance of superconducting qubits," says first author Joel I-Jan Wang, a postdoc in Oliver's group in the Research Laboratory of Electronics (RLE) at MIT.

Microgears Made from Germanium Generate Twisted Light

31/12/2018 - www.photonics.com



Researchers from the University of Southampton, the University of Tokyo, Toyohashi University of Technology, and Hitachi Ltd. built the tiny gears on silicon pillars using germanium-on-silicon-on-insulator (Ge-on-SOI) wafers with a high-crystalline-quality germanium layer. So far, generating a miniaturized light source on silicon has been hampered by silicon's inefficiency as a light-generating material. By comparing the prototype's light emission with computer simulation results, the researchers were

able to confirm that the gears generated twisted light.

MÉTAUX

Study Shows High-Entropy Alloys Exhibit Superior Performance at Extreme Conditions

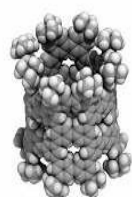
07/01/2019 - www.azom.com

In this study, the researchers have evaluated the mechanical response of the CoCrFeNi high-entropy alloy (see the results in the above image), and found that this alloy shows an elongation to failure of 62% and a high ultimate tensile strength of 1.26 GPa at 4.2 K, which are the best among nearly all of the metallic materials.

NANOMATÉRIAUX

Chemical synthesis of nanotubes

11/01/2019 - www.nanodaily.com



For the first time, researchers used benzene - a common hydrocarbon - to create a novel kind of molecular nanotube, which could lead to new nanocarbon-based semiconductor applications. Isobe and his team wanted a single type of nanotube, a novel form with controlled defects within its nanometer-sized cylindrical structure allowing for additional molecules to add properties and functions. The result is a novel nanotube structure with intentional periodic defects. We were shocked to see the molecular structure from crystallographic analysis.

Nanyang Technological University reviews use of carbon nanotubes in 3D printing

07/01/2019 - 3dprintingindustry.com

Due to high electrical conductivity CNT composites have been used to make improved batteries. Apart from electronics other uses include, water purification filters, "Carbon nanotubes membrane is a suitable candidate for filters for purification of water and gas due to its unique cylindrical nanostructure, high mechanical strength, high aspect ratio, and large surface area-volume ratio. CNT materials have been successfully used to 3D print shape memory polymer for use in soft robotics.

Illuminating nanoparticle growth with X-rays

27/12/2018 - www.nanodaily.com

"Understanding how the faceted catalyst is formed plays a key role in establishing its structure-property correlation and designing a better catalyst," said Zhenmeng Peng, principal investigator of the catalysis lab at the University of Akron. Using the ultrabright x-rays at NSLS-II and the advanced capabilities of NSLS-II's In situ and Operando Soft X-ray Spectroscopy (IOS) beamline, the researchers revealed the chemical characterization of the catalyst's growth pathway in real time.

Picosun's ALD Nanolaminates Extend the Lifetime of Biomedical Microimplants

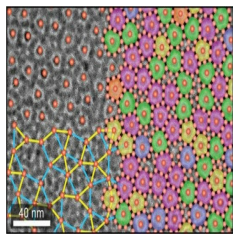
21/12/2018 - www.azom.com

Traditional encapsulation materials, mostly used for macroscopic objects such as pacemakers or Cochlear devices, include titanium metal, ceramics, and several polymers such as parylene or polyimide. ALD method produces ultra-high quality thin films, that cover uniformly and conformally even complex 3D-structures with nanoscale details, thus the desired effect of the coating can be achieved with much thinner material layers compared to the traditional methods.

Chemists create new quasicrystal material from nanoparticle building blocks

20/12/2018 - www.sciencedaily.com

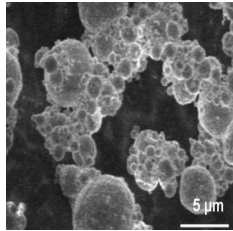
"It's a fundamentally new type of quasicrystal, and we've been able to figure out the rules for making it, which will be useful in the continued



study of quasicrystal structures. Using transmission electron microscopy, the researchers showed the particles assembled into discrete decagons (10-sided polygons), which stitched themselves together to form a quasicrystal lattice with 10-fold rotational symmetry. That 10-fold symmetry, forbidden in regular crystals, was a telltale sign of a quasicrystalline structure.

Discovery could lead to munitions that go further, much faster

20/12/2018 - www.sciencedaily.com



Although GO is a popular two-dimensional material that has attracted intense interest across numerous disciplines and materials applications, this discovery exploits GO as an effective light-weight additive for practical energetic applications using micron-size aluminum powders (μAl), i.e. "It is exciting to see with our own eyes through advanced microscopy such as TEM how a simple mechanical mixing process can be used to nicely wrap the μAl particles in a GO sheet," said Wu.

POLYMÈRES - ÉLASTOMÈRES

Covestro's Advanced Polymers to Develop Intelligent Electronics for Future: CES 2019

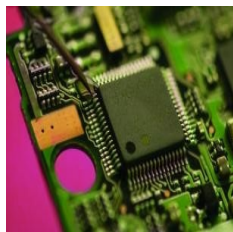
10/01/2019 - www.azom.com



These materials offer a balanced combination of properties including high flowability, stiffness, toughness, heat resistance, flame retardance and good aesthetics. - On display will be applications using the company's next-gen Maezio™ Continuous Fiber-Reinforced Thermoplastic Composite, which provides a new aesthetic direction in addition to advanced properties such as high strength, tunable stiffness and extremely lightweight. .

Low Viscosity, Thermally Conductive Underfill Epoxy

08/01/2019 - www.azom.com



As a single component system, EP3UF-1 is more convenient to handle, apply and store than typical two component adhesive systems. Well suited for underfill applications, Master Bond EP3UF-1 is a one part, low viscosity epoxy adhesive that cures rapidly at elevated temperatures.

SEMI-CONDUCTEURS

A major step closer to a viable recording material for future hard disk drives

20/12/2018 - www.sciencedaily.com

This has resulted in a method developed by the authors which leads to a significant enhancement of the L10 transformation rate in FePt systems by lowering the ordering temperature below 300 degrees C. "This is a major step toward realizing L10 FePt as a material for high density perpendicular recording," Gupta said. L10 FePt as a perpendicular recording media may one day be able to increase the magnetic recording density in HDDs beyond 1 terabit per square inch.

Service Information Numérique - Pôle IES

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