# Matériaux

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## SOMMAIRE



## GENERALITES

### Researchers Investigate Effect of “Dirt” on Surface Properties of Materials

27/08/2018 - www.azom.com

A thin layer of molecules is coated on any material with a mere contact with normal air. The properties of the material can be largely affected by this “molecular dirt”; however, the molecules themselves are challenging to analyze. The concept has been put forward that these molecules were an innovative type of water ice or even soda water formed from carbon dioxide in the air. Upon chemical analysis, they were found to be simple organic acids typically synthesized by plants.

### Free-standing liquid membranes as unusual particle separators

24/08/2018 - advances.sciencemag.org

Potential applications II: Self-cleaning, nonfouling membrane for continuous particle separationIn addition to the unique size selectivity of liquid membranes, their mobile liquid interface offers unique capabilities that cannot be readily accomplished by any conventional synthetic membranes, including in-membrane object maneuverability (Fig. For our experiments, we used deionized water, glycerol, tannic acid (22 ), PEO, and SDS as components of the liquid membranes and selected for average liquid membrane longevity.

## AEROSPATIAL

### 3D Printing Turbines for Re-Usable Rocket Engines

06/09/2018 - www.engineering.com

Manufacturing will take place in cooperation with partners and at GKN Aerospace’s Engine Systems Centre of Excellence in Trollhättan, Sweden. GKN Aerospace’s space business unit, in Trollhättan, Sweden, has been active in the Ariane programme from its inception in 1974 until the current Ariane 6 partnership, and has made over 1,000 combustion chambers and nozzles as well as over 250 turbines for the Ariane rocket to date.

### Lockheed Martin begins final assembly on NASA's Orion

30/08/2018 - www.spacedaily.com

The capsule structure, or pressure vessel, for NASA's Orion Exploration Mission-2 (EM-2) spacecraft was welded together over the last seven months by Lockheed Martin technicians and engineers at the NASA Michoud Assembly Facility near New Orleans. "It's great to see the EM-2 capsule arrive just as we are completing the final assembly of the EM-1 crew module," said Mike Hawes, Lockheed Martin vice president and program manager for Orion.

- Hierarchical 3D printing of nanoporous gold may revolutionize chemical reacto design
- Chemical Engineers Reveal Ground-Breaking Insight into Ultrathin Membranes
- U.S. Army lab explores materials at nano-level using 3D atom probe for future military body armor
- Scientists Model Metamaterial for Cloaking Nanosensors

## POLYMERES - ELASTOMERES

- High Elongation, Two Component Epoxy System with Excellent Thermal Shock Resistance
- Surprising antibacterial activity and selectivity of hydrophilic phosphonium polymers
- Transparent Bio-Based Polyamides with High-Thermal Stability

## REVETEMENTS

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- Coatings Make Natural Fabrics Waterproof
- First-ever colored thin films of nanotubes created

### Heat shield install brings Orion spacecraft closer to space

23/08/2018 - www.spacedaily.com

"Installation of the EM-1 crew module heat shield is a significant milestone representing the beginning of closing out the crew module assembly," said Jules Schneider, Lockheed Martin Orion senior manager for KSC Operations. "Witnessing assembly, test and installation of the EM-1 crew module heat shield brought an appreciation for its innovative design and assembly techniques," said Amy Marasia, the Crew Module Assembly operations lead in NASA's Orion Production Operations.

## MATERIAUX POUR L'ENERGIE

### MIT’s direct-write colloid 3D printing unlocks new possibilities in electronics and energy

30/08/2018 - 3dprintingindustry.com

Working on the nanoscale, MIT researchers have 3D printed centimeter-long structures that could change the face of electronics and optical sensors. Alvin Tan, a graduate student in MIT’s Department of Materials Science and Engineering, explains how using different particles such as metal alloys, and quantum dots could unlock a range of possibilities for the method. (MIT's Direct-Write colloid 3D printing process and X-ray imagery of the 3D printed colloidal structure. Image by Alvin Tan/MIT) Freeform 3D printing of a helical structure from colloids.

## MATERIAUX POUR L'OPTIQUE

### Experiment obtains entanglement of six light waves with a single laser

06/09/2018 - www.sciencedaily.com

Experiments performed at the University of São Paulo's Physics Institute (IF-USP) in Brazil have succeeded in entangling six light waves generated by a simple laser light source known as an optical parametric oscillator. However, because cooling is a necessary condition for the process, the crystal and mirrors are placed inside an aluminum box in a vacuum to avoid condensation and to prevent the system from freezing.

### Fast visible-UV light nanobelt photodetector

27/08/2018 - www.nanodaily.com

Recently, group of Qing Yang in Zhejiang University demonstrates a CdS-CdSxTe1-x-CdTe core-shell nanobelt photodetector, which possesses both high sensitivity and fast speed. The CdS-CdSxTe1-x-CdTe nanobelts were fabricated by introducing CdTe in the growth of CdS nanobelt. Considering the simple fabrication process and the high performance in responsivity, response speed and detection spectrum, the CdS-CdSxTe1-x-CdTe NB photodetectors will find wide applications in optoelectronic nano devices such as optical communications, sensing and imaging.

## COLLAGES –ADHESIFS

### FIP Foam Gasket Service Delivers IP Rated Seal and Productivity Benefits for LED Lighting Manufacturer

07/09/2018 - www.azom.com

In this case study Techsil provided a bespoke Form-in-Place Foam Gasketing service to TRT Lighting to produce an IP rated seal for the lid of an outdoor lighting luminaire. UK based, TRT Lighting Ltd (Thorlux Road and Tunnel Lighting) designs, manufactures and supplies energy efficient, environmentally friendly lighting products for exterior lighting markets. They are also very active in the high demand market of outdoor HID lighting replacement and retrofitting with LED luminaires.

### Better silicone adhesion Inspired by beetle feet

31/08/2018 - www.sciencedaily.com

"With this surface structure, we can vary and control the adhesion of materials the most. They found that the adhesion of unstructured surfaces on a glass substrate increased by approximately 30% after plasma treatment. What happens when the treated and non-treated structured surfaces are removed from the glass substrate show the recordings with a high-speed camera: Because of its higher surface energy the plasma-treated microstructure remains fully in contact with the surface of the glass for 50,6 seconds.

## COMPOSITES

### High-Kinetic-Energy Penetrator Shielding and High-Wear-Resistance Materials Fabricated with Boron Nitride Nanotubes and BNNT Polymer Composites

04/09/2018 - www.techbriefs.com

In order to maximize the protection ability against high-kinetic-energy penetrators, the following two major material properties should be considered: high hardness for rebounding and/or gross mechanical deformation of the penetrator, and high toughness for effective energy absorption during the mechanical deformation (and heating) of the protecting materials. The increased modulus of the BNNT/CNT composite promises the increase of toughness before fracture, which is another critical property for the anti-penetrator protection.

## NANOMATERIAUX

### Hierarchical 3D printing of nanoporous gold may revolutionize chemical reactor design

07/09/2018 - www.3ders.org

In a study published in the journal Science Advances, Lawrence Livermore Nationwide Laboratory (LLNL) researchers, together with their counterparts at Harvard College report on the hierarchical 3D printing of nanoporous gold , which they believe could revolutionize the design of chemical reactors. The 3D printed parts were put into a furnace to allow the particles to coalesce into a gold-silver alloy.

### Chemical Engineers Reveal Ground-Breaking Insight into Ultrathin Membranes

03/09/2018 - www.azom.com

An ultrathin polyamide nanofilter, also known as a membrane, is a very thin filter comprised of two parts – a thin polyamide film and a support layer on which the polyamide film sits. Crucially, this requires us to really understand the fundamental composition and workings of polyamide membranes, which the BP-ICAM research carried out in Professor Livingston’s Group is delivering to BP.

### U.S. Army lab explores materials at nano-level using 3D atom probe for future military body armor

30/08/2018 - 3dprintingindustry.com

“When you see things no other human has ever seen before, it’s very cool to think that I’m helping to push the envelope of new modern materials science, which then obviously is used for the Army,” said Dr. Chad Hornbuckle, Materials Scientist at ARL’s Weapons and Materials Research Directorate. (Dr. Hornbuckle analysing materials using the Cameca 3D Atom Probe. Samples of metal and ceramic a thousand times smaller than the end of a strand of human hair are placed within a Cameca 3D Atom probe to better understand its material structure during chemical experimentation.

### Scientists Model Metamaterial for Cloaking Nanosensors

28/08/2018 - www.photonics.com

Researchers from Politecnico di Torino and NUST MISIS modeled and prototyped a metamaterial for making nanoscale objects invisible in the uncovered THz frequency range. The key element of the new metamaterial is a metamolecule consisting of four dielectric lithium tantalate (LiTaO3) cylinders, each with a radius of 5 µm. This is the visible radiation of elements, where (a) is the central element without coating; (b) is coating elements without a central element; (c) is metamolecule: central element in the coating.

## POLYMERES - ELASTOMERES

### High Elongation, Two Component Epoxy System with Excellent Thermal Shock Resistance

07/09/2018 - www.azom.com

EP110F8-3 has a convenient mix ratio of one to two by weight; the color of Part A is clear while the color of Part B is amber. Working life for a 100 gram batch is 2-3 days at room temperature and can be cured within a few hours at 250-300°F.. Read more about Master Bond’s electrically insulative epoxy adhesives at https://www.masterbond.com/properties/electrically-insulative-adhesive-systems or contact Tech Support.

### Surprising antibacterial activity and selectivity of hydrophilic phosphonium polymers

06/09/2018 - www.sciencedaily.com

As these polymers can mimic the powerful peptide antibiotics, Paul J. Ragogna and Beth Gillies at Western University, London, ON (Canada), and their groups focus on phosphorus-containing polymers, the polyphosphoniums. Varying the relative content of hydrophobic and hydrophilic functional groups, the Western team introduced mannose sugars in the polymer. Instead, the authors hypothesize that the polystyrene backbone or the single terminal hydrophobic group of the synthesized polymers also play a role.

### Transparent Bio-Based Polyamides with High-Thermal Stability

03/09/2018 - www.azom.com

From wood waste to high-performance polymers: Terpenes from turpentine are converted to bio-based, transparent and heat-stable polyamides under application of a new catalytic process.

A sustainable alternative: monomers from wood waste The Fraunhofer Institute for Interfacial Engineering and Biotechnology IGB is exploring a sustainable substitute for the manufacture of new high-performance plastics from terpenes found in resin-rich wood. The researchers also plan to explore the biodegradability of the new polyamide.

## REVETEMENTS

### Cannibalistic materials feed on themselves to grow new nanostructures

04/09/2018 - www.nanodaily.com

"This study is about determining the atomic-level mechanisms and kinetics that are responsible for forming new structures of a 2D transition-metal carbide such that new synthesis methods can be realized for this class of materials," Unocic added. The material changed as atoms built new layers. At ORNL's Center for Nanophase Materials Sciences (CNMS), Yu Xie, Weiwei Sun and Paul Kent performed first-principles theory calculations to explain why these materials grew layer by layer instead of forming alternate structures, such as squares.

### Coatings Make Natural Fabrics Waterproof

04/09/2018 - www.techbriefs.com

For the new process, two things were combined: a shorter-chain polymer that, by itself, confers some hydrophobic properties and has been enhanced with some extra chemical processing; and a different coating process, called initiated chemical vapor deposition (iCVD), which was developed in recent years.

### First-ever colored thin films of nanotubes created

31/08/2018 - www.nanodaily.com

In their new study published in the Journal of the American Chemical Society (JACS), Aalto University researchers present a way to control the fabrication of carbon nanotube thin films so that they display a variety of different colours - for instance, green, brown, or a silvery grey. 'In theory, these coloured thin films could be used to make touch screens with many different colours, or solar cells that display completely new types of optical properties,' says Esko Kauppinen, Professor at Aalto University.