

Top news

Nano@school sets new record in 2018

Nano@school, a CIME Nanotech program for high school juniors enrolled in the science track, has been held at MINATEC since 2010. This year nearly 800 students from 25 high schools (including three international high schools) enrolled, setting a record for Nano@school!

ack in 2010, Nano@school was an experimental program offered to just two Grenoble-area high school classes. Two years later, 450 students from fifteen high schools enrolled. Since then, Nano@school has gradually expanded to high schools across the region and has even hosted classes from high schools in Japan, Turkey, and Germany!

A unique science immersion for high school juniors

The high school science-track juniors that come to CIME Nanotech for the day-long Nano@school program benefit from a unique experience. The day is part of a broader lesson plan prepared and taught by their science teacher, so the students arrive prepared and ready to learn. Nano@school includes workshops on near-field microscopy, microsystems, fabrication processes in the clean room, nanosafety, and more-all in facilities with state-of-the-art equipment that no high school has!

The workshops are developed and run by a team of 40 current and retired faculty and researchers from Grenoble-Alpes University, the CEA, and CNRS each year. And, since 2017, GIANT has assigned exchange students from MIT to teach certain workshops.

Nano@school has become so popular that other "@ school" programs have been developed at GIANT and the Synchrotron. And it is no longer just for high-school students. This year, a tech college in Annecy submitted such an impressive application that Nano@school couldn't refuse!

Contact ahmad.bsiesy@univ-grenoble-alpes.fr Read (or re-read) the 2010 article (in French): goo.gl/dz6b7N

No. 50

June'18

Innovation

Progress toward less toxic, more affordable hydrogen photosynthesis

esearchers at INAC and Grenoble-Alpes University recently demonstrated that it is possible to efficiently produce hydrogen using artificial photosynthesis in solution without the need for toxic, expensive photosensitizing agents. The researchers used nanocrystals with a copper sulfide and indium core protected by a zinc and sulfur shell, plus a cobalt-based molecular catalyst.

They produced hydrogen more efficiently than with ruthenium-based photosensitizers (the leading type used for this purpose). Furthermore, the inorganic materials used can be recycled several times without any notable loss of activity. The research is ongoing to obtain the same reaction with even cheaper materials.

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Inverse opals boost solar cell yields

NAC recently obtained excellent results on new dye-based solar cells, boosting yields by more than 10% and achieving current densities of nearly 20 mA/cm². The cells are based on a newgeneration organic dye and electrodes made of titanium oxide "inverse opals" that more effectively trap and scatter light.

An inverse opal is a periodic honeycomb lattice structure in which a periodic assembly of microbeads occupies the lattice structure—the opposite of a naturally-occurring opal. The honeycomb structure multiplies the surface available to trap photons and increases conversion yields. INAC, which would like to pursue the development of these cost-effective and rare-metal-free dye-based solar cells, has reached a milestone with this latest advance.

Learn more: renaud.demadrille@cea.fr

Learn more: https://onlinelibrary.wiley.com/ toc/16163028/28/15



The June 2018 issue of Mina-News marks an anniversary of sorts: It is the 50th issue of the MINATEC campus newsletter. Mina-News was first published in October 2008. Since then, more than 1,200 articles have been published in French and English!

Over the years, Mina-News has maintained its focus on topics like technological innovations, campus news, new equipment, startups, and partnerships. However, the number of readers has grown substantially. Today, Mina-News has more than 10,000 subscribers—with at least one-third from outside MINATEC.

This special issue includes updates on several topics covered in earlier issues—look for the Special 50th issue icon.

Innovation

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2D materials: Moiré engineering and dislocation theory converge

Researchers at INAC working with colleagues from the University of Illinois recently made new links between the moiré patterns in 2D materials and dislocation theory. It appears that the moiré patterns are merely optical phenomena. However at the scale of an atom, the patterns appear when layers are stretched, compressed, twisted, or moved out of alignment with each other. Therefore, the patterns can be considered dislocation networks between the layers.

Even more exciting is the fact that lines can be written into the moiré patterns. The lines could function like "tracks" that could be assembled to create nanometric circuits that would push miniaturization to its ultimate limits. The researchers are pursuing their work thanks to funding secured in the US.

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MRAM: Microelectronics industry adopts spintronics

he world's leading foundries—including Samsung, TSMC, and GlobalFoundries announced early this year that they would be starting volume manufacturing of MRAM memory, marking a major milestone. Among MRAM's many benefits: It costs less to manufacture than embedded flash memory, is extremely energy efficient, and offers high communication speeds and a virtually-infinite number of cycles.

Spintec's research was a big contributor to this major step forward. According to a 2016 study by the CEA Documentation and Marketing Research Department, the lab's research is at the international state of the art. Spintec has filed key patents on perpendicular magnetic anisotropy at transition metal/oxide interfaces (2006, 2008), spin-orbit couple (2010), and MRAM with perpendicular shape anisotropy (2017). Spintec's advances are helping shape tomorrow's MRAM technologies today!

Silicon photonics aiming for terabit-per-second speeds



B ack in 2009 *Mina-News* predicted that photons would be used to build logic gates. While that particular application for photonics has since been abandoned, Leti's silicon photonics research has continued to expand. Today, researchers are focusing on the very-high-speed communications requirements of datacenters and supercomputers. With photonics components, data transfer speeds could reach up to 400 gigabits—or even a terabit—per second.

Around 50 Leti researchers are working on the topic for partners like STMicroelectronics, HP, III–V Lab, and IRT Nanoelec. They are developing laser sources, photodetectors, waveguides, multiplexers, and switches. Silicon photonics is one of the rare fields where Europe is leading the world in terms of technology. As for potential customers, they are found around the globe!

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Read (or re-read) the 2009 article (in French) goo.gl/syqD5K

Compressed signal acquisition: Measure smart, use less energy!

he compressed acquisition of a radiofrequency (RF) signal consists of capturing the majority of information in the RF bands with an effective, energy-efficient system. It works much like a bat's echolocation system, gradually homing in on its prey—or, in this case, the signal. The technique will initially target radio receivers and cognitive radars that adapt to their environment.

Researchers at Leti are working on compressed signal acquisition. The institute recently developed and patented a compressed acquisition architecture in conjunction with Cornell University (United States). The architecture was integrated into an ASIC developed in-house and was proven effective up to a degree of parsimony of 12% (the useful signal takes up a maximum of 12% of the spectrum). It uses ten times less energy than the solutions in the literature.

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Bioactive surfaces and bone regeneration: LMGP's winning track record

MGP has been working on bioactive surfaces for bone regeneration for a decade. Today, the lab is internationally-recognized as a leader on the subject. It all started when biophysicist Catherine Picart came to LMGP in 2008. The story continued with four European Research Council grants, dozens of publications, three patents, and—more recently planned startup Regenerbone.

In the early years, LMGP focused on basic research. In 2011 the lab shifted its focus to bone regenerative medicine, studying stable and robust polyelectrolyte films that can be stored in dry form. All of the technological hurdles to using the films have been overcome, and the rage of potential uses is expanding beyond bone regeneration to include combining the films with 3D materials to deliver drugs and developing new cancer treatments.

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Read (or re-read) the 2008 article (in French): goo.gl/ybExzq

Connected knee implant contains miniature sensors made in Grenoble

eti is contributing to the €24 million FollowKnee connected knee implant project that kicked off in early 2018. Leti will develop sensors measuring 1 cu. mm to detect anomalies like infection, mechanical fatigue, and abnormal joint movements. The researchers will be working to overcome technical challenges like miniaturization, biocompatibility, the integration of a remote power supply, and RF communication in close proximity to the implant's metal components.

In 2016, some 80,000 people had knee-replacement surgery in France. And the process can be tricky, sometimes requiring up to six operations. Another FollowKnee partner will develop an augmented-reality surgical-assistance system to aid surgeons. Once the implants are in, Leti's sensors will keep a constant eye on them!

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Twist straintronics could give graphene new properties

n graphene monolayers electrons behave as if they do not have any mass, giving the material its exceptional electronic properties. In bilayer graphene, however, these qualities can be substantially altered. Until now, these effects had been controlled mainly by adjusting the "twist" between the layers. A team of researchers from Grenoble-Alpes University, INAC, and Institut Néel in conjunction with Cergy-Pontoise University showed that straining one layer more than another is a very effective way to adjust the stack's electronic properties.

Combining strain and twist could give 2D material stacks new properties like superconductivity. Twist straintronics could very well be the next form of materials engineering!

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Cycling: Detecting hidden electric motors

n research conducted under a contract between the CEA and UCI (the world's governing body for professional cycling), Leti is developing a system capable of detecting an electric motor hidden in a bicycle in real time.

The researchers are planning to develop a lightweight, compact, and reliable embedded tracker. They selected a magnetometer to detect the magnetic signature produced by all electric motors. Next, they will have to identify the many potential disturbances in the environment, from rotating wheels and pedals to passing motorcycles and cars.

The data from the sensor will be sent in real time via the cloud to race commissioners. UCI hopes that the future device will eliminate "high-tech" doping.

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Day by day

A lifetime guarantee for superhydrophobic coatings?

MGP is investigating whether it is possible to design superhydrophobic coatings that repel water for their entire lifetime. The research is being conducted under the French-American REACT project financed by the French National Research Agency, the CEMAM Laboratory of Excellence, and the US National Science Foundation.

One of the goals of the project is to develop a material capable of harvesting water from the atmosphere in areas affected by natural disasters. The material, which would be used to coat large surfaces, would alternate hydrophilic areas to condense water vapor with hydrophobic areas to move water to a collector.

In research conducted under a chair of excellence financed by Fondation Nanosciences, LMGP also began investigating permeable selective nanostructured membranes in March, with the goal of purifying the water collected.

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Learn more about REACT: https://react.seas.upenn.edu/

Avalanche photodiodes: Mynaric Lasercom signs R&D contract ³ with Leti

Germany's Mynaric Lasercom, which specializes in dynamic airborne and space communication networks, recently signed an exclusive R&D contract with Leti. The R&D conducted under the contract will focus on a new generation of avalanche photodiodes (APD) for optical open-air communications (inter-satellite, satellite-to-ground, and balloons).

Leti has been developing APD technology for a decade. The institute's research in this field was initially intended for very sensitive imagers, but other applications—LIDAR, photon counting, and telecommunications—soon emerged. In 2013, Leti teamed up with NASA and ESA to demonstrate that data transmission by laser between the earth and moon was possible. APDs are very sensitive and can significantly amplify signals. Now researchers must prove that the diodes can deliver the very high data transmission speeds demanded by optical telecommunications networks.

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Read (or re-read) the 2009 article (in French): goo.gl/Pu8mR9

Day by day

Go Concept joins the Phelma Partners' Circle

Generative of Technology's Phelma engineering school welcomed Go Concept into its Partners' Circle with a three-year agreement signed on April 3. Go Concept will play an active role in the life of the school, providing guest lecturers, attending Partners' Day, and by allocating its apprenticeship tax to the school.

Go Concept is a medium-sized company (250 employees) that operates in Switzerland, France, Belgium, and Canada, offering technological innovation consulting services to the watchmaking, medical, transportation, specialized machine, and energy markets. The company has seen revenue growth of more than 40% since 2015.

Go Concept recently hired a 2017 graduate of Phelma's Electronics, Microelectronics, and Telecommunications program who completed an alternating work-study curriculum. The company plans to hire 150 engineers this year.

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LAMA removed from list of nuclear sites

he CEA-ILL's Local Information Commission newsletter recently published an announcement that LAMA (the active materials testing lab) had been removed from the French government's list of nuclear sites following a government decree issued on October 13, 2017. The lab, located behind H1, was in operation from 1961 to 2002. It was used to study the behavior of materials (from laboratory and powerplant reactors) exposed to radiation. Work to dismantle and decommission the lab was completed in 2015. The building currently houses support staff.

Final paperwork for the decommissioning of the effluent and waste treatment plant is in progress and will soon close the nuclear chapter in the history of the CEA's Grenoble campus.

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7th French-American Workshop coming soon

aison MINATEC will welcome the 7th French-American Workshop on June 21–22, 2018. The event, which is run by GIANT, aims to build a French-American network of stakeholders from research and industry. Nearly 150 students, researchers, members of the diplomatic corps, and representatives of financing agencies are expected to attend.

On Thursday, Grenoble Institute of Technology faculty member Catherine Picart will present the research she is conducting on active biocoatings for regenerative medicine at LMGP. On Friday, Daeyeon Lee, a professor of chemical and biomolecular engineering at the University of Pennsylvania and a researcher at the SMART* Laboratory, will speak at the Midi MINATEC brown bag lunch. His talk, in English, will address interactions between soft materials near or at interface.

*Soft Materials Research and Technology

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NEWSLETTER

interview

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Thierry Derez, CEO, Covéa*:

"The Clinatec model is unique among biomedical research centers"

Your company recently began a three-year, €1 million partnership with Clinatec. Why?

Our brands have been committed to the disability cause for years. Specifically, we support the prevention and treatment of joint and bone disease, the second-leading cause of disability in France. We hope that our partnership with Clinatec will position us to more effectively respond to neurodegenerative diseases and the disabilities these diseases cause. We would like to be able to offer our policyholders—especially paraplegics and quadriplegics—solutions in terms of both prevention and care.

Are you partnering with any other biomedical research centers?

For the past five years we have supported the ParisTech BiomecAM Innovation and Disability Chair, an initiative of the Georges Chapak Institute for Human Biomechanics. The purpose of the chair is to gain a deeper understanding of the risks of damage to the musculoskeletal system and, ultimately, to bring our policyholders appropriate services, such as assistance for caregivers to help them prevent falls among elderly patients, for example.

What made you decide to also support Clinatec?

The Clinatec model, which brings together researchers, technology experts, and doctors, is unique among biomedical research centers. If, in three years, we can say that Clinatec's research has helped our sick or injured customers to live more independently or feel better, it will be a success. I am referring to the proof-of-concept testing already completed on the exoskeleton at Clinatec. The results give paraplegics real hope that they will be able to live more independently one day.

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*Covéa is France's largest mutual insurance company, selling insurance under the MAAF, MMA, GMF, and other brands.

Day by day

PTA (Upstream Technology Platform)

he PTA (Upstream Technology Platform) will turn ten on July 2, 2018. To celebrate, the platform will host an event for its affiliates and partners from academia and industry. The platform, which opened in 2008, is operated by INAC and LTM and plays a key role in Grenoble's innovation ecosystem. Its class-1,000 cleanroom possesses all of the equipment and know-how required to complete proof-of-concept testing on materials, components, and processes.

Users of the platform—whether they are from Grenoble or elsewhere—can work on their own or benefit from the support of a team of fourteen technical specialists. The platform's activity is growing steadily and it regularly purchases new equipment to meet the changing needs of the projects conducted there. For example, the platform acquired a new plasma etching machine this year.

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Read (or re-read) the 2008 article (in French): goo.gl/4WS3J7

Four engineering students off to Nepal

ubin, François, Jérémy, and Thibaud—engineering students at Grenoble and Bordeaux Institutes of Technology's Phelma, Ense3, and ENSEIRB-Matmeca schools—have just booked their flights to Katmandu, where they will arrive on September 12. They are taking a gap year, which they will devote to an outdoor sports and community outreach project they have named "Four Hundred Leagues under the Earth."

They will spend three months hiking across Nepal from east to west, covering some 1,500 kilometers and crossing four mountain passes at altitudes of more than 5,000 meters! They will then settle in at a school near Katmandu, where they will volunteer as science teachers for 200 at-risk children. Their lesson plans include workshops on computers and building a micro hydropower plant.

https://400lieuessurlaterre.wordpress.com/

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Ideas Days 2018: Innovating for the Climate

deas Laboratory will host its third Ideas Days on July 3 and 4. This year's event will be devoted to technology for the climate, with a program that includes four plenary sessions and around 40 30-minute breakout sessions for a professionals-only audience. Speakers will include specialists from construction, farming, environmental sciences, mobility, biomimetics, robotics, artificial intelligence, healthcare, and more.

And, for a change of pace, explorer Jean-Louis Etienne and mountaineer and adventurer Laurence de la Ferrière will provide their uniquely different perspectives on climate change and what it means. As always, Ideas Days will inspire, provide insights into the latest trends shaping society, and offer ample opportunities to share ideas in a receptive and friendly environment.

To learn more and to register online: www.ideas-days.com

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Recent Phelma grad founds agroecology startup

Paola Ceccato, who graduated from Phelma in 2015, won an award from the Fondation Norbert Ségard for her startup, Oikos Sphère, founded in 2017, Paola's goal is to develop a cooperative for the manufacturing and sale of biofertilizers.

Oikos Sphère is innovative in more than one way. In addition to a novel approach to agronomy, the company is also inventing a more socially-inclusive business model—its biofertilizers will be manufactured and sold locally by farmers seeking to create new revenue streams and diversify their businesses. Two test production centers have been created in Savoie and Côte-d'Or. A third will soon be up and running in Lyon. The company uses connected bioreactors that it prototyped to control the quality of the fertilizers produced at each center. Oikos Sphère recently changed its name to Rézomes.

www.rezomes.com

Contact: contact@rezomes.com

Live from MINATEC

Arianespace CEO to speak at Leti Innovation Days

eti Innovation Days, which will take place on July 4 and 5 at MINATEC, will welcome an international audience of 700 professionals from scientific research and industry. This year's event will focus on the impact of innovations in semiconductors on tomorrow's technological revolutions, the transformation of traditional manufacturing industries, and the emergence of new day-to-day uses of technology.

Arianespace CEO Stéphane Israël will speak on July 4 at 8:30 p.m. The talk is free of charge and open to the general public, however, you must register. Overflow seating will be available in the Grenoble Institute of Technology Auditorium, where the talk will be broadcast live. Mr. Israël will retrace the history of the space industry and provide his insights into the industry's future. He will also address the scientific challenges the industry will have to overcome in the short term and how the business landscape is being reshaped by new players like SpaceX and Virgin Galactic.

http://www.leti-innovation-days.com/

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Construction: Nearly 45,000 sq. m so built in ten years

ne of the pillars of the MINATEC project is property development. In ten years, nearly 45,000 sq. m of new facilities have been built! First there was B2I (3,200 sq. m)—Mina-News reported on the upcoming delivery of the building in June 2010. B2I was expanded by another 800 sq. m in 2015. Clinatec (6,200 sq. m) was completed in 2012.

The year 2015 saw the completion of three new buildings: BCC (10,000 sq. m), which houses Leti's management offices; Phelma 2 (7,000 sq. m), and the 500-seat Grenoble Institute of Technology Auditorium (1,400 sq. m).

In 2016 CCL (3,000 sq. m), an extension of Maison MINATEC, opened its doors. In 2017 the Photonics Platform (12,800 sq. m) was completed. Another two projects kicked off in 2018: the OIC (read article below) in May and BHT2 on June 1.

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Read (or re-read) the 2010 article (in French): goo.gl/ZYcozE

Three engineering students aiming for the top of the charts

Benjamin, Bryan, and Thomas—all second-year students at Grenoble Institute of Technology's Phelma engineering school—started their electro-pop-rock band Parallax eighteen months ago. In March they came in first in a Grenoble-Alpes University music competition. In September 2017 they were granted "student artist" status, which allows them to earn three ECTS credits each year and skip certain classes. Until recently, only those students who had high-level training in the arts were eligible for "student artist" status. Now, any student engaged in a major project in the arts can apply.

Grenoble Institute of technology has a total of 27 student artists, six of whom are enrolled at Phelma (the members of Parallax and three other classical musicians also enrolled at the Conservatory)

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Phelma celebrates tenth anniversary ∞

n 2008 *Mina-News* reported on the creation of the then-brand-new Phelma engineering school that resulted from the merger of ENSEEG, ENSERG, and ENSPG. The name Phelma was selected from around 20 candidates, including PEM, Phytec, Phynatec, and ENS MINATEC!

This year, Grenoble Institute of Technology's Phelma engineering will celebrate its tenth anniversary with a slate of events for students, graduates, staff, and corporate partners. A special VIP event is planned for December 20.

The school has enrolled 3,500 students and signed nearly 10,000 internship agreements since 2008. It has expanded its course catalog, created alternating work-study programs to give students hands-on experience, and has ventured into new fields like biotechnology and IoT.

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Read (or re-read) the 2008 article (in French): goo.gl/iHksMd

Ground breaks on new OIC building

onstruction on the future Open Innovation Center (as it has been temporarily named) began on Nelson Mandela Square in May. The 3,500 sq. m, three-story building is slated for delivery in mid-2019. It will host 70 people working on CEA Tech's collaborative innovation programs and will also be home to a showroom and prototyping workshop. One of the building's notable architectural features is a micro-perforated cladding material on the upper floors that will contrast with the unfinished concrete of the ground floor.

In terms of energy performance, the building was designed to consume 20% less energy than France's current RT 2012 standard—in line with the targets set by the City of Grenoble for the Presqu'lle urban development project. All of the building's heating and cooling will be provided by a geothermal system.

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Chrome5 conference room goes casual?

ntil recently there was nothing unusual about the Chrome5 conference room on the first floor of Maison MINATEC. But all of that changed in May! Chrome5, which is available to professionals from scientific research and industry, is like no other meeting space on the campus.

The 36 sq. m room has a capacity of twelve and offers three different environments. The lounge, near the windows, is furnished with sofas, round poufs, coffee tables, and floor lamps for a relaxed and cozy atmosphere. The trendy bar-height table and colorful stools provide the perfect setting for getting creative. Finally, an unusual twelve-sided table is ideal for more "serious" work.

Chrome5 also has some innovative tech amenities like a large touch display and interactive whiteboard.

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Horizons

Mass fabrication of FD-SOI circuits to begin

Leti has been developing FD-SOI, a material that substantially reduces circuit energy consumption, for years. In 2014 the institute signed a partnership with GlobalFoundries, the world's number-two foundry, to scale the technology up for mass fabrication. This year the partnership reached an important milestone: GlobalFoundries is starting mass fabrication of FD-SOI circuits for the IoT and embedded electronics markets.

This is not the first time that Grenoble has demonstrated its leadership in the international microelectronics research community. Leti has a long-standing partnership with STMicroelectronics, of course, and joined the IBM Alliance alongside around ten other semiconductor manufacturers in 2008. Ten years later, the institute is still conducting R&D with several of the Alliance's members.

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Read (or re-read) the 2008 article (in French): *goo.gl/2CcnKe*



Agenda

June 15, **GreEn-ER** Third Young Physicists' Meeting https://rjp-grenoble.jeunes.sfpnet.fr/

June 21-22, Maison MINATEC French-American Workshop hermine.vincent@cea.fr

June 26. Maison MINATEC Workshop for administrative staff

Contact: marine.renoir@cea.fr Register at: goo.gl/cSQDsZ

July 2-4, Phelma Fifth Introductory Course on Magnetic Random Access Memory www.inMRAM.com

July 3–4, **CEA** Opens Lab Ideas Days 2018: Innovating for the **Ćlimate** Contact: frederique.chartrand@cea.fr

July 4–5, CEA Grenoble Leti Innovation Days didier.louis@cea.fr

July 11–12, Phelma 2018 Conference on **Teaching College-level Physics** https://eps2018.sciencesconf.org/

August 27–31, Saint-Martin-d'Hères Campus **Condensed Matter Days** https://jmc2018.sciencesconf.org/

October 11–13, **Maison MINATEC** Parvis des Sciences science fair sebastien.berger@cea.fr

October 21, GIANT 11th Grenoble Ekiden team relay marathon www.grenoble-ekiden.fr

November 11-14, Grenoble **High Level Forum** alain.astier@cea.fr

Horizons

Two Phelma students invited to IEEE conference

second-year Phelma students have been invited to present at an IEEE conference alongside international PhD candidates and research scientists. The invitation is truly unexpected—but it is no hoax! An article authored by students Emrick Sinitambirivoutin and Florian Passelaigue was selected for the conference. In March Emrick presented at the Wispnet 2018 IoT conference in Chennai, India.

The pair's paper is on a network of wireless connected sensors they designed and tested during their first-year internship in India. Their system monitors crops to improve yields and save water. Farmers receive recommendations for irrigation on their smartphones that could help them reduce their water consumption by more than 40%.

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Startup MagIA tackles hepatitis B

agIA, founded in August 2017 to bring research conducted at G2Elab and LMGP to the market, has just been ranked by Challenges magazine as one of 100 startups to invest in in 2018. The company is developing a portable, ultra-fast immunological test kit. The kit can complete a test-one that would traditionally require drawing blood and about two hours in the lab-from a few drops of blood in just fifteen minutes.

The company, which currently has five employees, is now focusing on developing a test for hepatitis B, a disease that affects 250 million people worldwide, mainly in Africa, Southeast Asia, and China. MagIA is also working on a home test kit for chronic kidney disease with the support of the Auvergne-Rhône-Alpes regional government. The company plans to raise €1 million from investors in late 2018.

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Leti's M&NEMS 🕬 one major step closer to the markets

EMS are expensive to develop: Each new component requires its own fabrication processes. Leti has been working to develop generic manufacturing processes (M&NEMS) since 2010. A new partnership with a major industrial company could have M&NEMS ready for batch fabrication within three years.

As the name suggests, M&NEMS combines microelectromechanical parts and a 250 nmdiameter nanogauge. This innovative approach makes it possible to co-integrate different sensors on the same chip. It also provides a variety of differentiating features depending on the application: low noise and vibration resistance for gyrometers; linearity and ultra-miniaturization for pressure sensors; and a wide measurement range for magnetometers. The technology is protected by some 25 patents.

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Read (or re-read) the 2010 article (in French): goo.gl/oJSWd

Contacts

No.50 June'2018



MINA-NEWS is published by MINATEC, 3 parvis Louis-Néel, 38054 Grenoble Cedex 9 France Head of Publication: Jean-Charles Guibert; Editor-in-Chief: Julie Spinelli Contributors: Camille Giroud, Leti, <u>camille.giroud@cea.fr</u> Nathalie Mathieu , Phelma, FMNT, <u>Nathalie.Mathieu@phelma</u> grenoble-inp.fr Jérôme Planes, INAC, jerome.planes@cea.fr - Julie Spinelli, MINATEC, julie.spinelli@cea.fr Alexis Sableaux, Phelma, alex is.sableaux@phelma.grenoble-inp.fr Editing: Benoît Playoust and Bénédicte Magne English translation: SFM Traduction

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