MINATEC® NEWSLETTER

MINA-NEWS

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Top news

World's first microsystem fabricated on 300 mm wafers

This summer, researchers at Leti fabricated the world's first M&NEMS micro-accelerometers on 300 mm wafers, sending three crucial messages to the academic and industrial research and development communities.

First, the research proved that MEMS, or microelectromechanical systems, can be fabricated on 300 mm wafers, the largest format used in microelectronics. This advance will give MEMS access to the benefits associated with being among the most advanced technologies, from lower costs and energy consumption to more functions and smart capabilities.

97% of the fabrication process completed in house with a yield of 90%

Second, the future of Leti's M&NEMS technology looks bright. It could ultimately enable sensors—accelerometers, gyrometers, magnetometers, pressure sensors, and microphones—to be fabricated using a single technology. The technology could also be used to build combination sensors—with three accelerometers and three gyrometers, for instance—on a single chip.

The technology appears to be highly compatible with miniaturization, and fabrication on 300 mm wafers will make it even more attractive to manufacturers.

Third, the achievement cements Leti's position as the world's leading center for MEMS R&D. The fabrication process used this summer counted around a hundred steps, 97% of which Leti completed in house. The accelerometers are fully functional and some structures reached yields of 90%.

The technology has passed the proof-of-concept hurdle. Interest from manufacturers will be the prerequisite for further development work. However, Leti has successfully increased its lead over its major competitors: IME in Singapore, C2MI in Canada, and IMEC in Belgium.

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Innovation

LMGP a step closer to automated bioactive film production

Catherine Picart's team at LMGP plans to use the €150,000 it received from the ERC BioactiveCoating project to optimize the automated production of layer-by-layer polyelectrolyte films that trap the proteins that induce bone regeneration during reconstructive surgery. The films, which count between 2 and 50 layers, are produced through a time-consuming manual process.

The researchers are already gearing up to automate production using one of the lab's robots and, ultimately, transfer the technology to an industrial partner. Over the next eighteen months, the team will use the funds from the ERC project to reduce process costs and turnaround times, confirm the bioactivity of the films produced, and reduce the variability that plagues the manually-produced films.

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Spintec's new STT-MRAM gives a sub-nanosecond performance

Spintec is developing spin-transfer torque magnetic random-access memory, or STT-MRAM, with write speeds under one nanosecond. That's ten times faster than what Samsung and Intel are announcing for their 2016 product releases. Habitually, write speeds are around five to ten nanoseconds. But Spintec's memory uses a different—and faster—process to trigger the write pulse. The secret is two orthogonal polarization vectors placed on each side of the memory layer that maintain a non-zero spin-transfer torque (STT).

The ultra-fast speeds could make Grenoble's STT-MRAM compatible with very-high-potential applications like SRAM cache. The researchers are currently fine-tuning the concept, making improvements to the shape of the memory points and lowering switching energy as much as possible. They have filed several patent applications.

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Crystalline super-networks for super thermal insulation

It is generally accepted that the thermal conductivity of a crystalline material is lowest when the material is in its amorphous form. Researchers from INAC and LiPhy* recently used numerical simulation to show that thermal conductivity could be reduced two- or even three-fold by organizing the crystalline material in super-networks—which means stacking nanostructured multilayers in an orderly manner, alternating two chemical species with different atomic masses.

The researchers varied the multilayer periodicity to obtain the desired property and do not expect the material's structuration to affect electrical conductivity. If they are correct, they will have reconciled the seemingly irreconcilable—at least for two hurdles to nanometric components: effective electron transport and high thermal insulation.

**A Grenoble-Alpes University Joseph Fourier School of Science interdisciplinary laboratory*

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Innovation

Gallium focused ion beam enables non-destructive ToF-SIMS

A gallium focused ion beam (FIB) was integrated into Leti's ToF-SIMS spectrometer at its Nanocharacterization platform. The combined system makes it possible to analyze air-sensitive and very heterogeneous materials to depths of up to 100 microns.

Research was conducted on air-sensitive lithium-ion battery electrodes and TSVs (through-silicon vias), whose composition is very heterogeneous. In the first case, the integrated FIB-ToF-SIMS approach protected the lithium from oxidation, revealing the active-material particles' core-shell structure throughout the electrode's entire thickness (in the tens of microns). And for the TSVs, FIB-ToF-SIMS enabled 3D reconstructions from a series of cross-sections and images, with no alterations to the shape of the structure being analyzed, even in the absence of material.

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Nanoimprint lithography: Grenoble kicks off industrial evaluation

Since this summer, Leti has been in charge of Inspire, an industrial evaluation program for nanoimprint lithography. The program's launch was attended by over ten manufacturers, including Toshiba, Arkema, and STMicroelectronics. In addition, Austria's EVG, who already hosts demo campaigns, plans to provide the program with one of its most recent nanoimprint machines by the middle of 2016.

Nanoimprint lithography is used to replicate nanostructures that can be integrated into electronic circuits present in bioMEMS, photonics, and LEDs. Although less costly than optical and electronic processes, nanoimprint lithography does require special designs, materials, and operating conditions. The Inspire program will enable Leti to get this innovative technology scaled up for industrial rollout as quickly as possible.

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Highly-porous thin layers for chemical sensors

The porosity—and detection capabilities—of chemical and biochemical sensors' sensitive layers can be improved using a newly developed technique called foaming, where the sensitive layer, covered with a sacrificial layer, is annealed. The gases released as a result of the increase in temperature are trapped in the thin layer, causing it to swell—and creating more pores.

When applied to thin layers of organosilicon compounds during PhD research carried out at Leti, the technique boosted the layers' porosity to a record 70%, vastly outperforming the 50% that has been observed when using even the best traditional processes.

The researchers are currently evaluating the performance of this new sensitive layer breed—which offers the added benefit of compatibility with CMOS processes—and they are fine-tuning the process to achieve even higher porosities.

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Silicon photonics on course for reaching speeds of 10 Gbps and up

Leti is setting a new state of the art in silicon photonics link speeds. According to a dissertation on the topic defended in October by a Leti PhD candidate, the link speeds could reach up to 10 or even 15 Gbps in the coming years with sub-picojoule-per-bit power.

Specifically, the research focused on rapid electro-optical interfaces that could overcome the current technological hurdles: a TIA (transimpedance amplifier), an electro-optical receiver suitable for the TIA, and two other receivers with optimized optical clocks. Over the past two years, the research has resulted in three patent applications and has been presented at four international scientific conferences.

The CMOS 65 nm components will ultimately be compatible with 28 nm processes, opening the door to even higher speeds.

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Beads help map the optical near-field

A team of researchers from INAC, LTM, and Institut de Bourgogne showed that it is possible to map optical near-field phenomena in silicon nanocavities without using combined optical-AFM techniques like near-field scanning optical microscopy (SNOM). They did it using a camera, a regular microscope and 0.5 micron fluorescent beads, achieving resolutions comparable to SNOM, a tenth of the cavity wavelength.

Here's how it works: the nanocavity is placed in a fluid cell measuring 1 sq. cm in area and 20 microns high, forming a "pool." The microbeads immersed in the pool move along trajectories determined by the optical forces that the cavity generates. Therefore, the beads' trajectories reveal the nanopatterns of the cavity's resonant modes. A patent application has been filed.

Publication: Optofluidic Near-Field Optical Microscopy: Near-Field Mapping of a Silicon Nanocavity Using Trapped Microbeads. ACS Photonics, 2015, 2 (10), pp 1410–1415.

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Biological functionalization of PMMA changes scale

In R&D conducted under the EU ML^2 (MultiLayer MicroLab) project, Leti recently transferred a process to Germany's Fraunhofer Institute that functionalizes long spools (over 100 meters) of PMMA plastic sheets by grafting biological molecules onto the material. Oxygen plasma treatment is used to modify the plastic's surface, and then contactless printing is used to graft the biological probes onto the surface. The functionalized zones are uniform in size and shape.

The process is both robust and low cost. Variability from one production run to another is less than 2%. The material deposited is homogeneous. At this stage, the functionalized PMMA will be developed for use detecting toxins in drinking water. The capacity to functionalize plastic rather than glass at an industrial scale will also drive a dramatic reduction in the cost of labs-on-chip.

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Transistors: GaN enters the spotlight

Gallium nitride (GaN) is finally giving silicon a run for its money for use in power transistors capable of switching hundreds of volts. What has changed? Until now, GaN fabrication processes were simply cost prohibitive. Researchers at Leti are on the verge of overcoming cost concerns with their recent 650 V "normally-on" transistor, fabricated on a 200 mm GaN-on-silicon wafer using CMOS-compatible processes—two choices that will bring costs down substantially, while reducing the leakage current inherent to GaN.

The research focused on epitaxial growth of a high-quality material. Ten patents have been filed, and the researchers are pursuing improvements to the components in joint R&D with Renault with the intention of transferring the technology by end-2016.

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Innovation

A pressure sensor that knows what floor you're on

Leti's M&NEMS technology (see Top News on page 1) just keeps on giving, this time in the form of a pressure sensor that is as accurate as the best available capacitive sensors, and even more powerful in terms of linearity and insensitivity to parasite capacities.

The sensor can be coupled with M&NEMS accelerometers, gyrometers, and magnetometers on a single chip that could be used to power a pedestrian navigation system that works inside buildings where GPS signals cannot penetrate. The pressure sensor can detect changes in altitude of just ten centimeters—a degree of precision sufficient for letting users know what floor they are on, even in the world's largest shopping malls and airports. The sensor's full characterization will be completed by year's end. One patent application has been filed.

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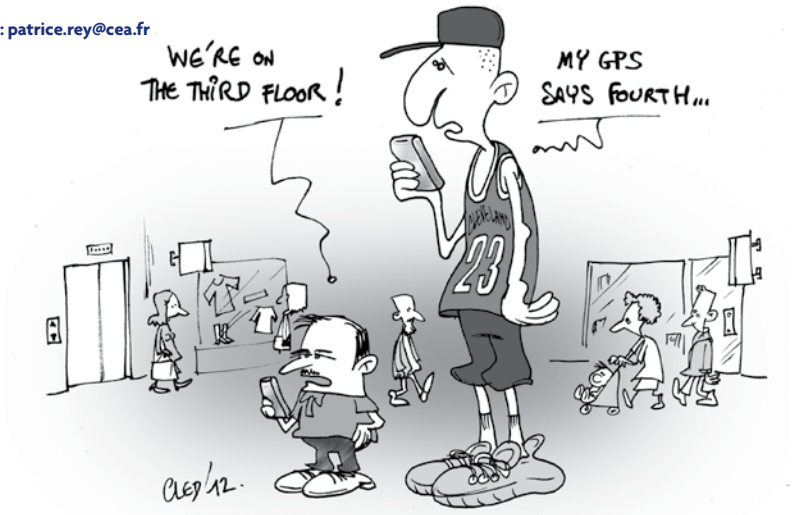

DC-to-DC converters now found on silicon

The DC-to-DC converters that power electronic circuits can take up nearly a third of a circuit board's surface area and account for up to half of a circuit's power consumption. One way to solve the problem is to integrate the converters closer to the circuits they power—in other words, right on the silicon! This ingenious solution would ensure a higher degree of granularity in terms of energy consumption and would also make it possible to adjust power to actual usage.

Researchers at Leti are working with two manufacturers to come up with just such a solution. The researchers designed a 3D on-chip (28 nm FDSOI) power supply to run six processors. The power supply adjusts the transferred amount of energy to meet actual demand from the processors. They built another power supply on FDSOI, this one for a low-power wake-up manager. With static power consumption of just 200 nA and yields of 80%, the chip has established a new state of the art. Two patents have been filed to protect these developments.

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Day by day

Phelma Junior Consultants admitted to national Junior Enterprise network

France's National Junior Enterprise Foundation (CNJE) recently admitted student-run non-profit business Phelma Junior Consultants (*Junior Conseil Phelma*, or *JCP*) to its national network after successful completion of a quality audit. Phelma Junior Consultants now has up to five years to complete the process of earning the national Junior Enterprise label, a hallmark of quality that will take Phelma Junior Consultants to new heights.

As a new member of the national Junior Enterprise network, Phelma Junior Consultants will have access to a slate of resources—from training and other tools to networking opportunities and calls for proposals—that will support the company's growth. In the meantime, Phelma Junior Consultants continues to run its program of events, including tours of sites like CERN and the Synchrotron, interactive meetings, and lectures on topics of interest like business management and PhD dissertations.

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Day by day

Sylvain Lodiot shoots for the stars (and comets!)

What engineer hasn't dreamed of breaking the career mold with an exceptional job? ENSPG (a founding school of Phelma) alumnus Sylvain Lodiot is living the dream, piloting the Rosetta space probe from the European Space Operations Center. But the job is a surprisingly complex one, involving 1,000 to 1,500 remote control commands per day. Each command takes dozens of minutes to travel the millions of kilometers that separate the probe from Earth.

Rosetta's Philae lander hasn't been heard from since last summer. But the probe's mission continues, thanks to twelve other on-board instruments gathering information about the Churyumov–Gerasimenko comet. Towards the end of 2015 the scientific results of the mission should offer new insights into the ancient comet and shed light on the origins of life on Earth. Rosetta's mission will end in 2016, twelve years after its launch.

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Droves of CheerUp! Phelma volunteers help young cancer patients

CheerUp! Phelma (a local branch of a nationwide nonprofit providing outreach to young cancer patients) has been busier than ever raising funds and increasing the student body's awareness of cancer. "Pink October" was dedicated to bringing awareness to breast cancer and to the disease's prevention. "Movember" focused on cancers affecting men, with a slate of initiatives that included a month during which men were encouraged to not shave their upper lip in order to win the "best moustache" contest. And in December and January CheerUp! Phelma will be selling 2016 calendars to students. All of these great ideas will of course contribute to making the wishes of local cancer patients come true.

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INAC and Institut Néel get new X-ray diffractometer

INAC and Institut Néel recently acquired a new X-ray diffractometer as part of a joint research project. The equipment, designed for studying thin layers and nano-scale objects, offers excellent resolution of three thousandths of a degree and two in-field and out-of-field configurations. It is also equipped with an oven for high-temperature (up to 1,100 °C) analysis.

The diffractometer will allow researchers to observe materials in a lab setting, a task that previously required a synchrotron beam. Teams have already used it to study gold beads whose equivalent volume is less than that of a 3-angstrom single layer and organic thin layers around 20 nanometers thick. LANEF (a Laboratory of Excellence funded by France's economic stimulus package) co-financed the diffractometer, contributing €200,000.

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interview

Christophe Durand, Research Scientist, INAC:

"Nanowire-based flexible LEDs a first step toward flexible displays"

INAC and three other institutes* have developed the world's first two-color, nanowire-based flexible LEDs.

What does this advance mean?

Flexible LEDs are a prerequisite to flexible, bendable displays. They are currently being made from organic compounds at the cost of less-brilliant blues and shorter lifespans.

Our nitride nanowire-based LEDs are much longer-lasting and can emit blue and green light. Once we add red, we will be able to emit white light and play videos.

How did INAC contribute to the research?

First, we used MOCVD to grow nitride nanowires typically measuring 1 micron in diameter by 25 microns in length. This is a topic we have been working on since 2010, and some of our research has earned grants from the French National Research Agency. We also transferred some of the technology we developed to startup Aledia.

Second, we developed a core-shell sheath around the nanowire. It is the amount of indium in the sheath's indium gallium nitride quantum wells that determines the color of the emitted light. In this research we successfully increased the amount of indium by 25% to 30% to get green light.

And you're able to bend the nanowires without breaking them?

Yes. They are coated with a polymer, and then detached from their substrate to obtain a nanowire carpet, which is a sort of flexible membrane. It is the polymer that enables the material to bend.

**CNRS, Paris-Sud University, Grenoble-Alpes University Joseph Fourier School of Science*

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Day by day

Leti expands IT security evaluation services with new accreditations

Leti is home to an IT security evaluation center (CESTI) approved by France's national IT security administration. The center continues to expand its range of evaluation services as proven by two recent achievements. First, CESTI Leti granted EAL6+ certification (EAL7 is the highest security level) to a Samsung secure microcontroller. The certification was validated by France's national IT security agency, ANSSI. Since then, CESTI Leti has completed several other EAL6+ evaluations.

In addition, the center recently earned recognition as an official evaluation laboratory for the new NXP-MIFARE certification system. This popular contactless IC technology is used for ticketing, access control, and mobile applications. These achievements mean further growth for CESTI Leti, in a market driven by increasingly stringent IT security requirements.

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ClouT project successfully rolls out sensiNact middleware in four smart cities

In 2015, the CEA successfully implemented sensiNact middleware in four test cities. The middleware brings together data from a host of urban sensors to send information regarding traffic, weather, pollution, and noise to a single user interface. The interface then powers a variety of apps, from information to risk prevention. The middleware was developed under the ClouT (Cloud Computing and Internet of Things) collaborative R&D project uniting Europe and Japan. The CEA is coordinating the three-year project to develop integrated solutions for smart cities.

The final months of the project, which will wrap up in March 2016, will be devoted to rolling out a global, intercontinental scenario—a key milestone for sensiNact, which should be transferred to an industrial partner in 2017.

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Horizons

EcoMarch center slated to open in 2018

The EcoMarch center for the design of architectured materials will open its doors in 2018 on the Saint-Martin d'Hères campus. The center is destined to become one of Europe's leading hubs for eco-efficient materials design. And, like MINATEC, it will build strong synergies between education, research, and industry, most notably via technology transfer. The center's innovative materials architecture and characterization platforms will leverage resources spread across several facilities and will provide space for new equipment.

Grenoble Institute of Technology is spearheading the center, which will operate under the Grenoble-Alpes University banner. Two Phelma programs located on the Saint-Martin d'Hères campus will be directly involved (Electrochemistry and Processes for Energy and Environmental Engineering; and Materials Science and Engineering) as will two flagship Grenoble Institute of Technology materials science labs, SIMAP and LEPMI.

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National Technological Research Institute conference held at MINATEC

The third conference of the National Technological Research Institute (IRT) network was held on October 13, 2015 at MINATEC. Hosted by Grenoble's IRT Nanoelec, the day provided an opportunity to review the latest advances in digital transformation, healthcare, transportation, materials, and processes. Participants started with a tour of the IRT Village, where the eight IRTs showed off their latest projects at shared booths and platforms. Cooperation between the IRTs and international relations, deemed crucial for the future, played a key role at the conference. And the event brought good news in terms of funding. Thierry Mandon, Minister of State for Research, announced that the government's third economic stimulus package for 2016–2019 would continue to support the IRTs, providing a supplement to private-sector funding and ensuring a bright and sustainable future for the IRTs.

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Horizons

Large instruments knock on manufacturers' doors

Grenoble's large scientific instruments can help both SMBs and larger companies reach their R&D goals. But how? And how much does it cost? Answers to these and other questions will be available at CARAC2015 on December 7–8, 2015 at Grenoble's Presqu'île scientifique site. More than 50 representatives of manufacturing companies will come to glean useful information, tour the facilities, and watch demos at the ESRF, ILL, CEA Nanocharacterization Platform, and CMTC.

The 2014 edition of this event attracted representatives of companies like ARaymond, Schneider Electric, bioMérieux, and Essilor. But there is still room for progress: very few manufacturers know that they have access to characterization capabilities right here in Grenoble. The location's high concentration of high-performance equipment makes it unique in France.

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More information at: http://www.ill.eu/press-and-news/events/carac-2015/

Avalun's pocket lab to be tested at four nursing homes in 2016

CEA spinoff Avalun, founded in 2013, will test its LabPad® for one year at four nursing homes across the region. The facilities will use the portable, communicating device to measure INR, a blood-clotting test.

Because the LabPad® only requires a small drop of blood from a finger prick, it should make life easier for both nurses and patients. This is especially true for patients with dementia, who may require multiple caregivers just to draw blood. The LabPad® is virtually connected to labs, which means that caregivers will no longer need to carry vials of blood. And fast results mean that patients' anticoagulant medicine can be adjusted right away if needed. The program was selected under France's digital healthcare initiative, administered at the regional level by the Rhône-Alpes regional government's healthcare agency.

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Rossignol and the CEA team up to design tomorrow's skis

Isère-based ski manufacturer Rossignol will be teaming up with CEA Tech over the next five years on R&D to improve the brand's current products and come up with new ones. Researchers at Leti and Liten are already working on connected sensors and materials for the manufacturer. This major partnership has already mobilized some 30 Rossignol staffers; ultimately, Rossignol's entire R&D department will be involved, bringing the number to around 60. The innovations developed under the program will be tested by professional skiers.

Over the past several years sporting goods manufacturers like Decathlon, Babolat, Petzl, Lafuma, and Corima have turned to CEA Tech to boost their R&D. This latest R&D partnership is once again proof that CEA Tech technologies are relevant to the sporting goods industry.

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Nanonet-based sensors could work for medical applications

FMNT will be coordinating an EU Horizon 2020 project on 3D CMOS integration of nanonet-based sensors for medical applications. The project will kick off in February 2016. Research will focus on using model molecules to evaluate the potential of applications like breath analysis for diabetes monitoring, and circulating tumor DNA detection for cancer monitoring. While the potential applications are clinical, the research outcomes targeted are technology focused. FMNT is already making and studying nanonets, made from random networks of nanowires. Now the researchers must determine whether the nanonets can be integrated onto CMOS circuits in a way that meets stringent compactness, efficiency, and cost demands.

The nanonets will be integrated by KTH in Sweden or by FMNT for circuits fabricated by ams AG in Austria or Cambridge CMOS Sensors in the UK. Institut Sinano in France will provide project management.

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CEA-Technip project wins global innovation award

Morphopipe, the flagship R&D project that came out of a Technip-CEA Tech joint lab set up in 2011, won Technip's 2015 global innovation award. The project leveraged a Leti technology to develop a live monitoring system for flexible underwater oil and gas pipelines. Ocean swell places substantial stress on pipe sections close to the surface; these sections are subjected to fatigue that can put their structural integrity at risk. The worst-case scenario is, of course, a break in a pipeline, bringing production to a halt.

With Morphopipe, accelerometers are integrated into the pipes during manufacturing and combined with data acquisition and processing capabilities. The pipe's residual lifespan can be reassessed at any time. Three patents have been filed and the technology is currently being transferred to Technip for scale-up.

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Europe blazes its own trail in nanoelectronics

Neireid, a Horizon 2020 project, kicked off on November 16, 2015, under the watchful eye of Francis Balestra (IMEP-LAHC). The project will establish Europe's nanoelectronics roadmap to 2025 and beyond. Europe no longer wants to simply follow the International Technology Roadmap for Semiconductors (ITRS), which is global in scope and whose focus is limited to circuits and memory, and with good reason. Europe's strengths lie in More than Moore, with new functions like sensors, biocircuits, power, and very-low-power.

The thirteen project partners, with include Leti and Grenoble Institute of Technology, will work with academic researchers, applied research labs, and manufacturers to predict future market needs in terms of uses, functions, and components and identify the associated requirements in terms of speed, energy consumption, features, and systems.

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Live from MINATEC

Phelma lobby decked out in art and science

The three mezzanine levels visible from the Phelma lobby have been transformed by an art installation titled *Les Balcons de Turing* (Turing's Balconies). The work, by Alexandre Perigot and Solang Production, is made up of three glittering stainless steel lace-work balconies, with patterns evoking zebra, giraffe, and leopard hides. But what does the African savannah have to do with an engineering school, you ask? Alan Turing, of course! The famous British mathematician and computer science pioneer was deeply interested in morphogenesis and came up with equations to decipher and model animal prints.

The installation is the result of a law requiring government agencies (the Isère General Council, in this case) to allocate 1% of the total cost of new buildings to a work of contemporary art.

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Live from MINATEC

Enerbee invests €4 million in its new production plant

Startup Enerbee, which has its offices at MINATEC, is investing €4 million to scale up its first miniature electric generators for industrial manufacturing. The generators are used to harvest energy from objects in motion, i.e. connected consumer electronics. Enerbee plans to brings its manufactured products to market by the end of 2016.

Enerbee's breakthrough technology has won numerous awards, including the French government's prestigious Global Innovation Award and the EDF Pulse Award, and offers an innovative solution to the challenge of powering connected objects. With annual global button-battery sales tallying at 30 million, Enerbee's energy-harvesting technology is an economical, environmentally-friendly alternative.

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NSF grants $3.8 million to UPENN-GIANT project

The United States National Science Foundation (NSF) has awarded a $3.8 million grant to the REACT (Research and Education in Active Coatings Technologies for the Human Habitat) project, a collaboration between the University of Pennsylvania (UPENN), GIANT, and Solvay USA.

The grant will be disbursed over five years to fund basic research to develop innovative materials for use in the production of emergency tents. REACH is one of seventeen projects selected by the NSF from among 291 grant applicants.

GIANT, the main international partner in the consortium, has assigned fifteen researchers from the CEA, CNRS, LMGP, and ILL to the project. Students in the GIANT International Internship Programme will also get a chance to take part: in 2016 fifteen UPENN postdocs will come to GIANT and five GIANT students will go to UPENN.

Learn more about REACT: https://react.seas.upenn.edu/
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GIANT welcomes eleven Argentinean and Japanese student interns

The second winter session of the GIANT International Internship Programme will welcome a cohort of eleven students from Argentina (under the Arfitec project uniting Grenoble Institute of Technology-Phelma and Instituto Balseiro) and Japan (Tsukuba and Keio Universities). A majority of the participants arrived in Grenoble in September for their internships at GIANT labs (LPSC, Institut Néel, CEA, Grenoble-Alpes University Joseph Fourier School of Science). The Argentinean students' internships focus on the nuclear sector and materials research, while the Japanese students will be working on nanoelectronics and software development.

All of the participants took part in a day-long orientation session and, in addition to their internships, have had the opportunity to take courses at Phelma and visit scientific sites like the CEA showroom and ILL. LC Mobility provided relocation assistance.

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Seven UGA PhDs earn awards for their dissertations

On November 26, 2015 seven Grenoble-Alpes University (UGA) PhDs received 2015 Dissertation Awards at a ceremony held at the Musée de Grenoble and attended by a number of local officials, including the President of the Greater Grenoble Intermunicipal Authority (la Métro). The award-winning PhDs included Antoine Coutrot (Grenoble Institute of Technology-Phelma) whose dissertation on sound-related information in a visual attention model was supervised by Alice Caplier at GIPSA-lab and the EEATS Doctoral School.

The seven winners were jury-selected from 20 nominees that represented all of the University's doctoral schools. Ronan Hinchet, the only finalist in nanoelectronics and nanotechnology, is also a Phelma graduate. Ronan's dissertation on the electromechanics of semiconductor piezoelectric nanowire was supervised by Mireille Mouis at IMEP-LAHC.

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Agenda

December 7–8, ILL
CARAC2015
Grenoble characterization facilities open house for businesses
www.ill.eu/press-and-news/events/carac-2015/

December 7–9,
Maison MINATEC
European nanomedicine meeting 2015
http://goo.gl/3Ij7Vg

December 7–10,
CNRS campus
Dautreppe Seminar 2015
Generating, controlling, and detecting light
http://dautreppe.photonique.grenoble.cnrs.fr/

December 16–17,
CNRS campus
Physics & Nanoelectronics 2015
http://goo.gl/anJq5b

February 2, 2016, Paris
OMNT annual meeting
www.omnt.fr/index.php?p=actu&id=54

February 4, 2016,
Maison MINATEC
Fifth annual *Scientifique toi aussi*!
(You, too, can be a scientist)
High school science students meet with researchers
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March 4, 2016,
Maison MINATEC
Eighth annual JSIam
Junior Scientist and Industry annual meeting. Young researchers meet with professionals from industry
www.jsiam-giant-grenoble.org/

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MINA-NEWS >

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