MINATEC® NEWSLETTER

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Event

MINATEC launches turnkey lab service worldwide

MINATEC recently introduced a new turnkey laboratory service—the only one of its kind in the world—inspired by the CIME Nanotech joint lab between Grenoble Institute of Technology and Joseph Fourier University. This service, called Nanolab, is intended for governments wishing to spur technological innovation in their countries.

Experts from the French Atomic and Alternative Energy Commission (CEA), CIME Nanotech, and Grenoble-based engineering firm 40-30 work with government agencies to set up their own state-of-the-art training and research centers—in just 24 months..

MINATEC came up with the idea for Nanolab after noticing that some countries often have trouble setting up their own micro and nanotechnology labs, despite the financial backing of international organizations. This is usually due to a lack of the necessary skills, poor operational or investment planning, or the failure to properly account for local constraints.

Grenoble-trained technicians

Under Nanolab, a team of Grenoble experts works with local government agencies or universities to identify their research lab needs, determine the appropriate size and equipment for their lab, train lab staff, and maintain the facility and its processes. The team may remain on site for six months after the lab opens to help scientists develop the lab's first demonstrators.

Before a new lab goes live, its technicians spend three to four months in Grenoble to learn best practices at MINATEC and 40-30 and lay the groundwork for future collaboration.

In the two months since Nanolab was introduced, it has already garnered keen interest from around ten countries, including Tunisia, Brazil, and Peru. The ultimate goal is to create a global network of MINATEC-certified R&D centers that leverage student and researcher exchange programs to share knowledge and best practices.

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Innovation

Astrophysics gets an optical boost

Scientists at the Grenoble Astrophysics Institute recently made a major advancement in telescope technology by replacing conventional mirror-and-lens systems with Leti's integrated optical chip. The pioneering system they installed in the Very Large Telescope Interferometer (VLTI) in Chile uses an unprecedented four telescopes simultaneously, with any number of possible combinations. Moreover, the first images were obtained in just four days, vs. the six months typically required, with incredibly high resolution—high enough to see a screw head from 300 kilometers away!

Leti, which is already developing other integrated optical chips for astrophysics applications, is working on new functions that could be useful in major industries like telecoms.

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Leti unveils a 10 Gb/s integrated transmitter-on-silicon

Leti and III-V Lab have marked a major step forward in silicon photonics by combining onto a single chip a hybrid laser (III-V materials and silicon) with 9-nm wavelength tunability and a silicon modulator. Conventionally, the laser sources for photonic components are fabricated separately and transferred onto the substrate, which complicates the process and results in higher costs.

This next-generation transmitter was developed under the EU Helios project in association with Belgian and British researchers. It has numerous applications in telecoms, such FTTH networks and data transfer among and within data centers. The project team is now looking to achieve higher bandwidths, like 25 Gb/s—or even 40 Gb/s.

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Silicon micro-needles deliver painless injections

Painful vaccinations will become a thing of the past thanks to a clever new invention from Swiss medical device maker Debiotech. The company is working with Leti to develop a process for making silicon micro-needles that are only 700 microns long, preventing the needle from reaching the nerves in the dermis while boosting injection efficacy; for certain vaccines the necessary dosage could be cut by a factor of five.

Based on a prototype provided by Debiotech, Leti scientists designed a 200-mm deep etching process, which has already achieved record yields, marking yet another successful collaboration under Leti's 3S technological innovation offering (see MINA-News 18).

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Innovation

Cleaner graphene powder has arrived

INAC researchers have developed an improved graphite exfoliation process that generates a graphene powder totally free of any type of metallic or organic contamination. Graphite exfoliation is the most commonly used method for making graphene powder in quantities ranging from grams to kilograms, and INAC's new, patent-pending process eliminates a major bias that had been plaguing the study of graphene's intrinsic properties.

For example, the magnetic behavior of this ultra-clean powder is 100 times more reliable than that of a conventionally-produced one—which illustrates the magnitude of the effect that contaminants can have. This new process is particularly attractive to scientists studying graphene for applications like catalysis, energy storage, and energy transformation.

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More efficient processors thanks to magnetism

Scientists have found that by adding advanced magnetic tunnel junctions (MTJs) to frequency demodulators, they can cut the power requirements of some applications by a factor of ten. Spintec calculated the energy savings using the design and simulation software it developed in association with two university partners. Now scientists are even more confident in the potential of MTJs to overcome the obstacles faced by CMOS technology—like overheating, reduced reliability, and high power consumption—in circuit miniaturization.

Spintec's software can be configured to model all types of MTJs and includes a design kit to help circuit designers use the software effectively. The company has already made the software available to its university partners and plans to distribute it more widely, especially among foundries.

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A truly miniature high-resolution magnetometer

Leti has developed a miniature version of its high-resolution helium 4 magnetometer that offers state-of-the-art sensitivity on a gas sample of just 100 mm^3, or 320 times smaller than the full-size model. Leti, which carried out the development work in association with FEMTO-ST (a CNRS joint research unit), has filed a patent for a process that would make the tiny magnetometer isotropic—the first of its kind at this scale.

Leti's miniature devices are lighter, cheaper, and less energy-hungry than conventional magnetometers, making them ideal for applications in aerospace and defense. They can also function at room temperature. Biotech research center Clinatec is looking at the possibility of using Leti's new magnetometers to replace the liquid-helium-cooled ones currently used in magnetocardiography and magnetoencephalography.

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Grenoble nanowires take center stage in Atlanta

A second-year PhD student from IMEP-LAHC is currently performing a six-month research assignment under Dr. Zhong Lin Wang at Georgia Tech in the United States. Dr. Wang is a pioneer in the application of nanowires' piezoelectric proprieties, and is working to use nanowires developed in Grenoble in systems for harvesting mechanical energy.

The project with Dr. Wang came about after scientists from IMEP-LAHC, LTM, and Institut Néel found a way to increase the piezoelectric coefficients of gallium nitride nanowires by a factor of ten by inserting a nanometric layer of aluminum nitride into the wires. The PhD student is seeking to better understand—and find practical ways to use—the fundamental properties of these heterostructured nanowires.

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Understanding the shape of red blood cells

Why do some hollow biological objects (like red blood cells and pollen grains) lose their rounded form to take on a variety of multi-faceted shapes? To find out, scientists at INAC—in association with two other laboratories—carried out a series of experiments using water-filled gel-phase membrane vesicles ranging from 1 to 15 microns in diameter.

The scientists varied the osmotic pressure in the vesicles until they deflated into the shape of specific biological objects. The scientists then used these data to generate a computer model that could predict the shape and number of facets a vesicle would attain based on its original diameter and the deflation rate.

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Day by day

3D integration meets 4G

The ultra-high bandwidth Wide I/O interface developed by Leti and ST-Ericsson will soon be used in a promising new way: to link two processors in a new system-on-chip, called MAG3D, for 4G telecoms applications. Incorporating the latest in 3D integration, MAG3D will deliver twice as much power as its predecessor, Magali, without having to go through a lower technology node.

Leti and ST-Ericsson are also working with STMicroelectronics to test the first batch of the WIOMING 3D application processor equipped with SDRAM—the first application of Wide I/O technology—which came out of the foundry in January 2012.

WIOMING is intended for use in high-end smartphones and tablet computers. Other applications for the Wide I/O interface could soon follow.

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Phelminaire puts the spotlight on teaching in 2012

The fourth annual Phelminaire—a day devoted to recognizing the hard work done by the Grenoble Institute of Technology-Phelma faculty and administration—will be held on July 2, 2012. This year will see two exciting new changes: first, the venue will be transferred to the Phelma campus at Saint-Martin-d'Hères; and second, the program will be enhanced to include morning workshops, role-playing games, and round tables designed to help staff work together more effectively and improve their teaching methods by emphasizing teamwork and greater student involvement.

After a cocktail reception with a "musical blind test" game, participants will enjoy a hearty lunch of Spanish paella before heading off for an afternoon of invigorating activities.

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Day by day

Grenoble's iGEM team ready to select a project

The cross-university team that will represent Grenoble in the 2012 iGEM synthetic biology competition is gearing up to make its final selection between two possible projects: adding an innovative genetic network to a shared bacteria so that the bacteria can visibly detect a pathogen and secret a molecule to destroy it; or, enhancing a genetic network so that it can make a molecule cyclically.

In June the Massachusetts Institute of Technology (MIT) will send all competing teams the biobricks that will let them begin manipulating DNA fragments. The Grenoble team has to have its project ready for the European qualifications in Amsterdam in early October, one month before the finals in Boston.

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Leti set to make greater use of ESRF's D2AM beamline

Leti has recently entered into a partnership agreement with ESRF to increase its usage of the D2AM beamline. The two research centers have agreed to share time on the beamline over the next five years in order to facilitate and speed its usage (under two months). Young scientists supervised by both centers will carry out joint research projects on the beamline, and the centers have already applied for funding from the French National Research Agency to study silicides for fully-depleted silicon-on-insulator (FD-SOI) applications.

The D2AM beamline can be used for spectroscopy, diffraction, and diffusion, and perfectly rounds out Leti's characterization capabilities. It can be used with very high-brilliance synchrotron sources with variable wavelengths. Leti scientists intend to use it to observe nanometric layers and buried objects, for example.

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LMGP gets a confocal AFM

The Materials Science and Engineering Laboratory (LMGP) is now the proud owner of an atomic-force microscope (AFM) coupled with a fluorescence microscope. This €200,000 piece of state-of-the-art equipment was financed by the European Research Council (ERC) and is installed in CIME's Nanomonde research center.

The AFM will let LMGP scientists observe biological matter on a scale anywhere from a few nanometers to a hundred micrometers, and the coupled fluorescence microscope will let them precisely determine which areas to look at with the AFM. For the ERC project, scientists will use the AFM to better understand the behavior of cells in contact with multi-purpose films. It will also be made available to other project teams for research or targeted student experiments.

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Nanotech meets biotech at the MIGAS® summer school

The 2012 MIGAS® international summer school on advanced microelectronics will bring together 50 research and teaching faculty, PhD students, and industry professionals in Autrans, France, from June 23 to 29, 2012. This year the focus will be on micro and nanotechnology for biology and medicine, with a series of lectures, panel discussions, and poster sessions on topics like the manipulation of biological objects, diagnostic techniques, and potential neurosciences applications.

Dr. Donald Martin, holder of the Chair of Excellence at the Fondation Nanosciences, will discuss new energy harvesting techniques, and Dr. Chao-Sung Lai of Taiwan will give a lecture on biosensors. Valérie Stambouli and Didier Delabouglise from LMGP will chair the event.

Full program and registration at www.migas.fr
Contact: laurent.montes@minatec.inpg.fr

Phelma graduates makea splash in the job market

According to the latest job placement survey of top-tier French universities (by the *Conférence des Grandes Ecoles*), nearly 80% of the Grenoble Institute of Technology-Phelma Class of 2011 was employed (including PhD research assignments) two months after graduation, at an average salary of nearly €35,000. 40% of the jobs were in the Rhône-Alpes region, 20% in the Paris-Île-de-France region, and 15% outside France—including half in Switzerland and Germany.

Nearly a third of graduates got job offers pursuant to their senior-year research projects. The top-hiring industries were IT and energy.

A third of the Class of 2011—like those of 2009 and 2010—went on into a PhD program; a relatively high percentage that sets Phelma apart from most other French engineering schools.

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Phelma's management team gets a makeover

Following the appointment or election of three of Phelma's senior managers to the Grenoble Institute of Technology management team—Anne Vilcot as Vice President of Human Resources, Lorena Anghel as Head of the Doctoral School, and Didier Bouvard as Vice President of the Scientific Board—Phelma is pleased to announce four new appointments.

Stéphane Pignard has been named Head of Academic Programs; Jean-Christophe Toussaint, Co-Head of the Physics & Nanosciences Department; Mounir Benabdenbi, Co-Head of the Integrated Electronic Systems Department; and Rémy Dendievel, Co-Head of the Materials Science & Engineering Department.

All four of these men were already members of Phelma's research faculty, and will help lower the average age of the school's management team. They intend to further the initiatives undertaken by their predecessors.

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LMGP beefs up its staff

LMGP's Biological Matter & Materials Team, headed by biophysicist Dr. Catherine Picart, will soon have the pleasure of welcoming Dr. Thomas Boudou, a research project manager at CNRS.

Dr. Boudou will draw on his biomechanical know-how to spearhead a breakthrough project on muscle tissue in association with the CEA's iRSTV, the Albert-Bonniot Institute, and the French Neurosciences Institute. He intends to study the formation and spatial orientation of healthy and diseased tissue in 3D, in order to determine its architecture and ability to contract.

Dr. Boudou holds a PhD in mechanics and conducted post-doc research on cellular mechanotransduction mechanisms at the University of Pennsylvania.

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Interview

Thomas Iljic, of CEA-Tech in Tokyo:

"Japanese innovation is back, stronger than ever"

You've been representing Leti in Japan since 2007. What changes have you seen since Fukushima?

Manufacturing in the country basically stopped between March and September 2011 while companies were repairing and restructuring their plants. But things have definitely picked up since then, with sharply faster innovation cycles. The Japanese want to recover the ground lost to their competitors. And since electricity prices have shot up 17% in most of the country, there is a large focus on renewable energy.

Has this made it more difficult to promote CEA-Tech?

No, because we have a long-term vision. We have built up a network of 2,200 contacts at over 300 different companies. Some 200 people are expected to attend the next Leti Day on October 3, 2012, including professionals from Fujitsu, Hitachi, Nikon, Toyota, Nissan, and NEC. Also, MINATEC has a strong reputation in Japan; it served as a model for the Tsukuba Innovation Arena, a similar innovation campus.

Why did the CEA decide to open an office 10,000 km from Grenoble and work with Japanese companies?

We find that in terms of technology, the Japanese business climate is highly complementary to that in France and elsewhere in Europe. For instance, at this year's Leti Day we will look at sensors that can be integrated into everyday objects like smartphones, and used for healthcare applications. This field is growing rapidly in Japan, and we need people here, locally, to earn companies' trust and seal agreements. IMEC and Fraunhofer also have offices in Tokyo, which they opened several years ago.

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Day by day

BeSpoon invents the pico-GPS

BeSpoon's cutting-edge technology can locate items or individuals to within a few centimeters, either indoors or out. This impressive feat is achieved by measuring the flight time of an ultra-wideband signal (between 500 MHz and 1 GHz) with a precision of 125 picoseconds.

The company's chips can be placed on all types of easily-lost objects, like your keys, wallet, smartphone, laptop, and even your toddler's favorite teddy bear. BeSpoon was created in 2010 from a research project at a Leti joint laboratory, and has already produced viable prototypes. The next step is to conquer the retail market.

Contact: www.bespoon.com

Horizons

Dasein Interactions revolutionizes city planning models

If you've seen the GIANT model in the DRT showroom, then you are already familiar with Dasein Interactions' work. This start-up, in its final incubation phase at GRAIN, uses the next-generation interfaces developed at Leti to create models combining unparalleled interactivity with exceptional ease-of-use. Thanks to Dasein's cutting-edge technology, city planners can view exactly what a pedestrian sees at a given crosswalk, where shadows fall at different times of the day, and what the effects would be of different types of building facades and street fixtures, for example.

Dasein plans to unveil an even more powerful version in late June 2012. As soon as the company is officially launched it will begin marketing to local city planners and seeking national partnerships.

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Wavelens cuts the cost of smartphone autofocus

The tiny motors that power the autofocus on smartphone cameras could soon be a thing of the past, thanks to technology from Wavelens, a start-up scheduled to be launched by the end of this year. The three Leti engineers behind the budding company have developed adjustable-focus lenses integrated on silicon that should be ready for the market within three years. The new lenses take up half as much space, use 25 times less power, are easier to build into smartphone cameras—and are significantly cheaper. The technology is protected by eight patents filed by Leti, and could eventually be used for other features like zoom and image stabilization.

In addition to the mobile phone market, Wavelens is also targeting higher-added-value applications like IR imaging, endoscopy, and 2D barcode scanners.

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Horizons

ImmunID makes its mark in oncology

Grenoble-based start-up ImmunID is presenting the results of clinical trials on its Lymphodivpenia biomarker at the prestigious American Society of Clinical Oncology (ASCO) Annual Meeting being held in Chicago from June 1 to June 5, 2012. This ground-breaking immune system biomarker can be used to maximize the efficacy of chemotherapy treatments while limiting the side effects.

The literature offers ample confirmation—including two articles in *Nature*—of the important role that immunology can play in treating cancer. ImmunID aims to leverage this discovery and carry out other large-scale clinical trials; the company will first lay the groundwork by raising capital and forming top-tier research partnerships.

Contact: npasqual@immunid.com

Diabolo: embedding electronics in fine threads

Recently, three engineers from Leti began exploring the idea of a start-up to develop and commercialize a technology called Diabolo. The new technology, which Leti has protected via numerous patents, makes it possible to embed electronics like LEDs, RFID tags, and sensors in textile or plastic threads with diameters of around one millimeter. The threads are compatible with processes used in the apparel, tire, piping, and geotextile industries, where they could allow high-added-value capabilities to be integrated into traditional manufactured products.

The technology is currently being developed under the EU Pasta project, and several demonstrators are on show at the BHT showroom. New, more sophisticated demonstrators will be unveiled within the coming months.

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Live from MINATEC

IRT Nanoelec slated for €160 million of government funding

The IRT Nanoelec research institute was founded on April 11, 2012 through a joint venture between the French National Research Agency (ANR) and the French Atomic and Alternative Energy Commission (CEA), and comprises 17 public- and private-sector research partners—including Leti and Grenoble Institute of Technology. The institute is slated to receive €73 million of French government funding by 2015, and, if initial results prove promising, another €87 million between 2015 and 2019. The research will be focused on 3D integration and silicon photonics, with the goal of developing marketable technology.

The institute's research partners will invest the same amount, making IRT Nanoelec a major boon for the Grenoble area. In addition to groundbreaking R&D, the institute will also promote technology transfer and user-centered innovation and back training programs dispensed by Grenoble Institute of Technology and Grenoble Ecole de Management.

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Paris engineering students spend a day at the CEA

Two École Centrale Paris professors—Dr. Emmanuel Defaÿ and Dr. Alexandre Reinhardt—brought their second-year materials process engineering students to MINATEC for a day to learn about the CEA's latest research.

The twelve lucky students visited the B2I showroom, Leti's clean rooms, and several CEA labs focused on biology, healthcare, and energy harvesting. They also got to meet CEA scientists and learn about the Agency's internships—which three students ended up applying for—and PhD research programs.

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Live from MINATEC

Engineers and scientists—want to try your hand at teaching?

Faced with an explosion in the number of tutorials and lab courses being offered to its first-year students, Grenoble Institute of Technology-Phelma is making an appeal to MINATEC engineers, scientists, and PhD students to lend a helping hand. The goal is to hire around 30 temporary teachers for subjects like math, physics, electrical engineering, automation, signal processing, materials science, physical chemistry, and computer engineering.

Jean-Yves Castellan, head of the CEA-Leti showroom and prototyping, responded to last year's appeal after reading about it in MINANews. *"I taught 30 hours of lab courses last year, which I really enjoyed. The students were all different—some worked really hard, others were more laid-back—and I had to adapt to their learning styles. However, they were all eager to learn about my career and industry experience. I totally intend to do it again this year."*

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Mark your calendars for the fifth Phelma Partners Day

Some 40 companies and nearly 800 students are expected at this year's Grenoble Institute of Technology-Phelma Partners Day on October 18, 2012. The event is being organized by the school's Corporate Relations and Communications Departments and Phelma Junior Consultants.

The morning program will include four talks at Maison MINATEC on: the climate for SMEs in the Grenoble area; job interview basics; innovation in the aerospace industry; and engineering jobs in services organizations.

Throughout the day attending companies will give 20-minute presentations about their businesses and technologies. They will also meet with students and recent graduates interested in internship or job opportunities. Students will, of course, be excused from classes the day of the event.

Program and registration at http://phelma.grenoble-inp.fr/jdp
Contact: relations.entreprises@phelma.grenoble-inp.fr

Manufacturers help shape academics at Phelma

As at all Grenoble Institute of Technology schools, each academic program at Phelma undergoes a periodic review. Last year, the Electrochemistry and Processes for Energy and the Environment program went under the microscope. This year, two additional programs are undergoing a review: Systems and Microsystems for Physics and Biotech in February and Physics and Nanosciences in June.

The reviews are conducted by a board made up of around a dozen Phelma faculty and staff members and an equivalent number of outside experts—from the worlds of manufacturing and research—representing potential employers for Phelma graduates. The review boards look at all aspects of the Institute's academic programs and put forward recommendations for future changes.

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Agenda

June 5,
Grenoble Institute of Technology-Phelma
High Tech U Day 2012, 3rd session

June 14–15,
LMGP
Symposium on transparent conducting nanostructured materials
daniel.bellet@grenoble-inp.fr

June 19–20,
MINATEC
14th Leti Annual Review
http://www.leti-annualreview.com

June 20–22,
Maison MINATEC
European Nanoelectronics Design Technology Conference
http://tima-sls.imag.fr/dtc/

June 23–29,
Autrans
MIGAS 2012 Summer School: Nanodevices for Biology and Medicine
www.migas.fr

July 2,
Phelma Saint Martin d'Hères campus
Fourth-annual Phelminaire team-building day
for all Grenoble Institute of Technology-Phelma faculty and administrative staff
alexis.sableaux@phelma.grenoble-inp.fr

August 26–September 15,
Grenoble
ESONN'12 (European School On Nanosciences & Nanotechnologies)
http://esonn.fr/
didier.delabouglise@grenoble-inp.fr

September 24–26,
Maison MINATEC
2012 International Semiconductor Conference Dresden - Grenoble
http://iscdg2012.insight-outside.fr/

October 18,
Maison MINATEC
Grenoble Institute of Technology-Phelma Partners Day
http://phelma.grenoble-inp.fr/jdp/

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MINA-NEWS >

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