

Top news

Jean-Luc Vallejo, ISKN
(maker of the iSketchnote):

“Crowdfunding put us six to twelve months ahead of schedule”

You raised \$346,000, nearly ten times your original goal. Did that surprise you?

It did! We set out to raise \$35,000, hoping to maybe reach \$100,000. But interest in the project was clear virtually from the beginning. We reached our goal of \$35,000 in the first fourteen hours of the month-long campaign!

Looking back, I feel that we could have raised even more, like \$500,000, if we had opened an office in the US, where 30% of the funds raised came from.

What do you attribute this phenomenal success to?

The PC peripherals market took off in the 90s, with things like mice, scanners, and disk drives. We are going to see the same thing happen with tablet peripherals. And at ISKN we are ready to ride the wave with an accessory for the undisputed market leader—the iPad.

Because iSketchnote brings handwriting to the iPad, we feel that students, graphic artists, designers, and, generally, anyone who loves to write will be won over.

What will the influx of funds change for ISKN?

Financially, nothing. Most of the funds we raised will be used to finance the manufacture of the 2,500 products ordered by our investors. These products should be delivered in May 2014. One thing that did change was the interest we got from manufacturers and venture capitalists—business development talks with them are underway!

Raising capital through crowdfunding put us a solid six to twelve months ahead of our business plan, crucial on a market where time is of the essence.

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**The company is in the early start-up phase, and is 12 months ahead of schedule.*

Innovation

The world’s smallest memory is Made in Grenoble

Leti researchers have built a 16-nm charge-storage memory—the smallest ever cited in the literature. Until now, the most advanced memory systems measured 40 nm. Even better, the tiny new memory has already been demonstrated to work, offering the necessary temperature and cycling stability, not to mention low power consumption. The memory could be used for embedded systems in the automotive industry, for example.

The researchers used a split-gate architecture that has been patented for a decade, and added spacers to eliminate a costly lithography step. They controlled the memory grid’s shape and length to ensure good electrical performance. A total of five patents have been filed to protect the invention; talks are underway with manufacturers.

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Seeing nanocomponents in a new light

The PFNC can now characterize the chemistry and morphology of nanoelectronic systems to within 2 nm spatial resolution. A team of researchers from Leti, CNRS, and STMicroelectronics has proven the effectiveness of this new characterization technique on a 45-nm transistor. The researchers combined electron microscopy and atom probe tomography to generate images that turned out to be a goldmine of information. For example, scientists can now characterize boron-doped silicon in 3D with detection thresholds of under 1×10^{-18} at/cm³.

The research, which kicked off in January 2013, was conducted under a French National Research Agency “Aptitude” project and also involved Cameca, a scientific instrumentation supplier. The goal was to improve the reconstruction algorithms used on images obtained via atom probe tomography. The next step will be to characterize a 14-nm transistor.

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Water pockets in a 5-nm-thick film

The performance of PEFMC-type fuel cells often boils down to details like the physical and chemical characteristics of the 5-nm polymer film used to coat the platinumized carbon of an electrode.

Researchers at INAC joined forces with their Canadian colleagues to study the issue. They used statistics-based mechanical design tools to develop a digital model of the structure. What they discovered was that the water molecules carried through this ultra-thin film are distributed irregularly, creating “pockets” of water.

The digital model will now be used to improve this very sensitive fuel-cell component. It can also help engineers better interpret indirect observations of the films generated using X-ray and neutron diffusion, for example.

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MINATEC NEWS

No. 27
Dec. '13

Innovation

Telephony: an antenna that follows you from network to network

Cell phone antennas are now so tiny that they can no longer adapt to different networks' frequency bands, seriously impairing data transmission and call quality. Leti is working on a smart miniature antenna capable of adapting its impedance all on its own. The antenna already covers GSM, DCS, UMTS, Wi-Fi, and LTE; low 4G frequencies could soon be added to the mix.

Leti researchers combined an antenna with a reconfigurable adaptation circuit that uses 130-nm CMOS-SOI technology. The device can withstand power in excess of 2 W, making it compatible with telephone transmission circuits. The researchers also built a demonstrator to validate the device, developed under the EU C2Power project to improve the energy efficiency of handsets.

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Upstream Technology Platform makes suspended graphene components

Despite its two-dimensional structure, graphene does not readily lend itself to the fabrication of MEMS and NEMS components using conventional microelectronics methods. A Ph.D. student at IMEP-LAHC decided to tackle the problem by making suspended graphene bridges with controlled dimensions and electrical contacts using processes that can be transferred to large surfaces.

She achieved this by carefully controlling the process of eliminating the carbon residue from the resins used for the transfer, and resolving the bonding problems that occur when freeing the graphene bridges. That resulted in process yields of greater than 90%. Ultimately, the suspended structures could be used in deformation, mass, and vibration sensors. An article on the research is forthcoming.

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MRI contrast agents now twelve times more effective

A team of INAC-Liten researchers has developed MRI contrast agents that are twelve times more effective than those currently on the market. They used a novel method for encapsulating the active ingredient, gadolinium, which enhances MRI contrast—but is toxic. Gadolinium is usually encapsulated in organic ligands when used in MRI tests to keep it from being absorbed by the body.

The researchers used a new, hydrophobic organic ligand, which made it possible to encapsulate the active ingredient in porous silicon nanoparticles just 25 nm in diameter. This structure lets the water molecules circulate freely, increasing the contrast of the images obtained during MRI tests. INAC has filed several patent applications on the technology, which should open the door to future advancements in molecular imaging.

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Kwant: powerful, open source quantum transport simulation solutions

The Kwant quantum transport package was developed by researchers from France (INAC) and the Netherlands over a period of three years. It is designed with one goal in mind: to make physicists' lives simpler. Easy to use and quick to program, the Python-based solution is known for its fast, accurate results.

More than just a simulation tool, Kwant can easily solve a broad range of theoretical quantum physics equations. Just a few dozen lines of code is all it takes to describe a system or phenomenon—like tunnel effect, metal spin valves, topological insulators, graphene, or quantum Hall effect under a strong magnetic field—and calculate its quantum properties.

Download the software and documentation at <http://kwant-project.org/>
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Day by day

Sofradir-Leti joint lab turns ten

Sofradir and Leti recently celebrated ten years of joint research. And their decade of partnership has been fruitful, with nearly a hundred employees involved in several world firsts and a number of major new innovations in the works. The joint lab works on cooled infrared components, covering all aspects of development, from metallurgy and electronics design through to system engineering. The lab's achievements include the first-ever 10-micron pixel pitch component, developed in 2011, and avalanche photodiodes that will let astrophysicists at the Very Large Telescope in Chile capture 1,500 images per second.

As 2013 draws to a close, the joint lab is supporting Sofradir's industrial rollout of a new technology, p/n, to manufacture infrared components usable at temperatures of 130 K to 150 K (instead of the usual 77 K). This latest achievement will establish a new global state of the art.

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LMGP gets a robot for high-throughput thin-film deposition

LMGP recently acquired a robot capable of high-throughput thin-film deposition. The robot marks a significant improvement over the lab's previous equipment—and will save its researchers valuable time.

The new Tecan robot automates tasks that, up until now, were done manually. It makes films that require a large number of layer-by-layer deposits directly on substrates with a multitude of wells. Thanks to the robots, the layers are now perfectly reproducible.

The thin films are crucial for the lab's biomaterials and tissue engineering work, which requires the use of precious proteins. Research topics include muscle regeneration, bone reconstruction, and cancer processes. In parallel, LMGP could also make thin films for use by other labs.

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IRT Nanoelec striving for even greater connectivity

IRT Nanoelec, a Technology Research Institute, was founded 18 months ago and continues to forge ahead, especially in the area of corporate partnerships. The Institute signed an agreement with Agilent Technologies this spring, and plans to further expand its network of partners in the new year.

In terms of research programs, the IRT Nanoelec is focusing heavily on connectivity for the home, transportation, and healthcare, through a two-pronged approach that allies technical innovation and user-centered development. Its researchers are looking at society's needs and the best way to meet those needs using new connectivity technologies. For instance, one research team is working on instrumented parking garages and energy management systems for smart homes.

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Day by day

Phelma Junior Consultants gets students ready for the job market

Student club Phelma Junior Consultants will hold a job and internship day in January. The goal is to help Grenoble Institute of Technology-Phelma students better navigate the uncharted waters of the job market. The event will include CV-writing workshops, personality assessments, and mock job interviews. The activities will be facilitated by professionals from the school's career services department, and third-year students will be given priority.

When students sign up for a mock interview, they state whether it is for an internship or permanent position, and the industry and type of job they are targeting. Each interview lasts 20 minutes, and is followed by immediate feedback to help students pinpoint their strengths and weaknesses.

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Grenoble hosts 220 engineering school deans

The CIT, or *Commission des titres de l'ingénieur*, which oversees France's state-sanctioned engineering degree programs, has chosen Grenoble for its next annual meeting. The event will kick off on February 10 with an international colloquium to be attended by representatives of US accreditation organizations ABET (Accreditation Board for Engineering and Technology) and AACRAO (American Association of Collegiate Registrars and Admissions Officers). These special guests are particularly relevant this year, as France's engineering degrees were recently recognized as equivalent to the US Masters of Science.

And on February 11, a national colloquium will be held at MINATEC on the role of France's engineering schools in the country's reformed higher education and research landscape. The colloquium will also feature discussions about the future of the profession ("Engineering in 2024").

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New OMNT study on nanoparticles for healthcare

The OMNT (Micro and Nanotechnology Observatory) is diversifying its activities. The Observatory's current science and technology intelligence lineup, which covers fifteen topics, will now be rounded out with technological and economic reports and market research. The Observatory's insights are backed by a network of 300 experts with insider knowledge of emerging issues.

A first report, published in late October, provides an overview of the main players in the field of multifunctional nanoparticles for healthcare. The international study looked at 700 patents and 12,000 scholarly articles. It gives a description of each organization, including the type of nanoparticles and their functions (diagnostics, therapeutics, delivery, etc.) as well as the pathologies targeted. Work is currently underway on forthcoming studies on other topics.

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Countdown to the CEA's 2nd Nanosafety Conference

Some 150 nanosafety professionals, including manufacturers from a range of industries, will come to the CEA on December 11 for its 2nd Nanosafety Conference. This one-of-a-kind event is being organized by the CEA's Nanosafety Platform—officially inaugurated on November 22—and will address the topic of "Nanosafety: Challenges, Advancements, and Scientific Hurdles."

Speakers from the CEA and the Nanosafety Platform will discuss various issues related to nanomaterials safety, such as national and EU regulations, measurement and characterization methods, toxicology, and occupational health. They will then turn the floor over to manufacturers, who will share their experiences. The event will also include a tour of the Platform's laboratories just after lunch.

For the program and registration, go to (in French) <http://pns2013.insight-outside.fr/>
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Horizons

EMI testing in B2I's anechoic chamber

The anechoic chamber in MINATEC's Integrative Industries Building (B2I) wasn't designed for electromagnetic interference (EMI) testing—but it turns out to be a perfect fit. Researchers have successfully performed EMI tests in the chamber to analyze and help certify electronic devices made by Grenoble-based start-ups.

Because the chamber is shielded against electromagnetic fields and prevents them from being reflected, researchers can use it to measure low- to very-low-frequency electromagnetic fields. And its 2,880 m³ volume means researchers can take near-field and far-field measurements.

The chamber was initially designed to test antennas, but has found a new calling with EMI testing to analyze electronic systems, with a view to their enhancement and certification.

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LXRepair off to a roaring start

LXRepair, an expert in enzyme activity testing and DNA repair, was created on September 26 from a research project at INAC. It was founded by an INAC researcher and a business developer who both have ambitious growth plans: they expect to make their first kits by the end of this year and start hiring staff early next. By the end of 2014 they plan to have completed a successful capital-raising round and have expanded to six employees.

The start-up targets two markets: pharmaceutical research, with systems for characterizing molecules that can interfere with DNA repair; and clinical research, with methods for identifying patients responsive to chemotherapy or highly sensitive to radiation therapy. The latter market should quickly become the company's main growth driver.

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iGEM team wins Best Mathematical Model award

The iGEM 2013 team from Grenoble Institute of Technology-Phelma—which competed in the synthetic biology category of MIT's iGEM competition—didn't make it past the European qualifications in Lyon in October. But the four students didn't go home empty handed: they won a gold medal for their project as well as the best mathematical model award.

The project is now being furthered by Master's students in nanobiology and nanophysics at Grenoble Institute of Technology-Phelma and Grenoble University's Joseph Fourier School, as part of their lab training courses at LMGP. The goal is to develop electrochemical methods to characterize the activity of the KillerRed protein.

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Horizons

Digital SQUIDs hit the road

Pascal Febvre, a researcher at IMEP-LAHC and the University of Savoie, has outlined a superconductivity roadmap for digital SQUIDs, or superconducting quantum interference devices. His roadmap was published in *Superconductor Science and Technology* and focuses on two applications: detecting solar bursts—which are highly disruptive to space communications—and earthquakes.

Pascal's research team at the University of Savoie already helps operate the world's only two SQUID-equipped research centers. They are also working to develop SQUIDs with fully digital signal processing capabilities and advanced dynamic performance. They eventually hope to be able to detect magnetic fields less than one femtotesla strong—that's even weaker than the field emitted by our brains when we're sleeping!

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Fluoptics raises €2 million for global business development

Fluoptics raised €2 million from angel investors in September, which it will use to market its Fluobeam® system for several clinical applications in the United States, Asia, and Europe. The Fluobeam® fluorescence imaging system already has the CE marking for medical devices and should get FDA approval in early 2014; approval is pending in several Asian countries.

Fluobeam® is already in use at 25 research centers in seven countries. The company is targeting a global market of 66,000 hospitals and clinics for use in cardiovascular, reconstructive, cancer, and liver surgery. It plans to soon hire four new employees. For now Fluoptics' international sales expansion will be driven by its distribution network.

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Scientists to play show and tell

On January 23, CEA-Grenoble will hold the third annual "You Too Can Be a Scientist!" day to introduce high school juniors and seniors to careers in science. The event, part of a nationwide program, will include three-minute one-on-one elevator pitches by fifteen research professionals (engineers, scientists, technicians, and Ph.D. students).

During these pitches—which were highly popular in 2013—each professional describes his or her line of work with the help of an object, like an ultra-thin wire for a biologist working on nanotubes or a model of an atom for a chemistry technician.

The event will also include lab tours and opportunities for the students to meet with the presenters.

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Grenoble Institute of Technology-Phelma brings Altran on board

Grenoble Institute of Technology-Phelma signed up a new corporate partner this fall: Altran France. Altran is a leading global innovation consulting and advanced engineering firm, with €742 million of revenue and 9,000 employees in 2012 (including 2,200 hired that year). It has a large presence in southeastern France, especially in Lyon, Grenoble, and Pierrelatte. The company has already been working with Phelma through internships and recruitment and Partners' Day.

The main goal of the partnership is to help Phelma graduates find jobs. Every year Altran will also support the school's academic programs by providing experts to give talks on technical topics, and by sponsoring events like Women in Engineering Day.

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Chemistry takes the spotlight in Leti clean rooms

A five-person film crew spent a day in Leti's clean rooms in October making a video on how block copolymers—compounds developed by Arkema—are used in a new nanolithography process.

The video was commissioned by Arkema, which also runs a joint laboratory with Leti. It is part of a series of eight-minute videos (available on YouTube) the company has made to teach high-schoolers and undergraduates about careers in chemistry. The videos are made by Capa, one of Europe's leading audiovisual production agencies, and are filmed at locations in Germany, Brazil, the US, Japan, and elsewhere around the world.

The video filmed in Grenoble was posted online on November 26 and will be made available to Leti.

Watch the video at <http://youtu.be/JcNDsJCveqo>
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Live from MINATEC

UroMems moves into the High-Tech Building

Healthcare industry start-up UroMems moved from CIME Nanotech to the High-Tech Building on October 1, to further its product R&D.

UroMems was established in 2011 to market technology developed under a Ph.D. research project carried out jointly by TIMC-IMAG, TIMA, and APHP. The company makes active implants for people with severe urinary incontinence. UroMems' devices work like an artificial muscle (to replace the sphincter), and activate according to the patient's physical activity. Because the pressure exerted by the implants eases when the patient is at rest, there is no risk of long-term tissue damage—a common side effect with other systems.

UroMems' implants contain microsensors, an innovative myoelectromechanical system, and embedded electronics. The company is in discussions with Leti to enhance some of the implant's components.

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MINATEC TV goes interactive

MINATEC TV's Channel 2, "Live from Our Labs," already boasts 12 videos—and more are on the way next year. The big star of Season 2 will be interactive interfaces that let users learn more in just a few clicks. The first "clickable" film will be on lens-free imaging, a technology currently being studied by researchers at Leti and IRSTV.

Thanks to the new interfaces, users can learn about a technology by clicking on icons representing different applications, zoom in to read a journal article, and visit the social networking sites of labs and partner businesses directly from the film credits. The films also have a revamped design and updated content.

www.minatec.tv
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Live from MINATEC

Three don't-miss Midi MINATECs lined up

MINATEC Director Jean-Charles Guibert will speak at the Midi MINATEC brown-bag lunch on December 13, as a special guest to mark the 199th edition. He will talk about the innovation campus' development—and provide a benchmark of the campus' competitors—over the past few years.

Then on December 20, Yves Bréchet, France's High Commissioner for Atomic Energy, Material Science Professor at Grenoble Institute of Technology, and member of the French Academy of Sciences, will celebrate the landmark 200th edition. He will speak on an issue dear to MINATEC researchers' hearts: "Scientists and Engineers."

The 2014 season will kick off on a fun note on January 10. Students from the Grenoble Institute of Technology theatre club, InProx', will give an improv' show on various MINATEC-related topics.

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THE MIDI MINATEC BROWN BAG LUNCH SERIES 200TH EDITION...



IP heavyweights Avenium Consulting and Questel to merge

Avenium Consulting is a CEA Investissement subsidiary that provides intellectual property (IP) consulting services. Questel is a global leader in online IP services. On October 11 these two IP giants announced they will merge, creating an industry-leading firm that covers the entire IP value chain, from capturing ideas to transferring them to industry.

The merged company will employ 150 IP experts. Each business will continue to operate under its own brand name. For Avenium Consulting, the merger opens the door to major international expansion, since Questel—which posts revenue growth of 20%–30% a year—already operates in Europe, the US, China, and Japan.

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How to get Horizon 2020 funding for ICT research

On December 10, Minalogic and Grenoble Institute of Technology will give a training session on how to apply for funding for collaborative projects under the EU's Horizon 2020 Framework Programme for Research and Innovation. The session will target information and communication technology (ICT), with the goal of helping researchers and entrepreneurs take advantage of this high-profile financing opportunity.

The training will leverage Minalogic's expertise to provide valuable support to the cluster's entrepreneurs, and help small businesses submit bids under the first call for proposals expected in early December. One of the goals of the program is to increase the number of small businesses participating by 20%. Participants will also get a chance to meet new business partners through one-on-one meetings, in an optional networking event organized by Enterprise Europe Network.

For the program and registration, go to www.minalogic.com
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Agenda

December 4, Maison MINATEC

OMNT Nano H₂
seminar on nanoconstruction for
hydrogen energy and fuel cells

<http://omnt.congres-scientifique.com/decembre2013/> (in French)

December 9, Maison MINATEC

Fostering ERC in Grenoble

www.giant-grenoble.org/en/news/56-news/736-fostering-erc

December 10, Grenoble Institute of Technology-Phelma

**Minalogic training session
on Horizon 2020 funding
applications**

www.minalogic.com/Actualites/1141%23%26informations-projets-europeens-horizon2020/18-l-agenda.htm#Uox2cl3Gqis (in French)

December 11, CEA

2nd Nanosafety Conference

<http://pns2013.insight-outside.fr/> (in French)

December 13, Maison MINATEC

199th Midi MINATEC

brown-bag lunch with Jean-Charles
Guibert, MINATEC Director

www.minatec.org/midis (in French)

December 20, Maison MINATEC

200th Midi MINATEC

brown-bag lunch with Yves Bréchet,
French High Commissioner for Atomic
Energy, speaking on "Scientists and
Engineers"

www.minatec.org/midis (in French)

January 10, Maison MINATEC

Midi MINATEC

brown-bag lunch with an improv'
performance by the Grenoble Institute of
Technology theatre club InProx'

www.minatec.org/midis (in French)

January 23, CEA

**"You Too Can Be a Scientist" day
for high-school students,**
with three-minute elevator pitches by
research professionals

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MINA-NEWS >

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Editing: Benoit Playoust and Bénédicte Magne; layout: Philippe Tur; printing: Format Éditions

English translation: SFM Traduction