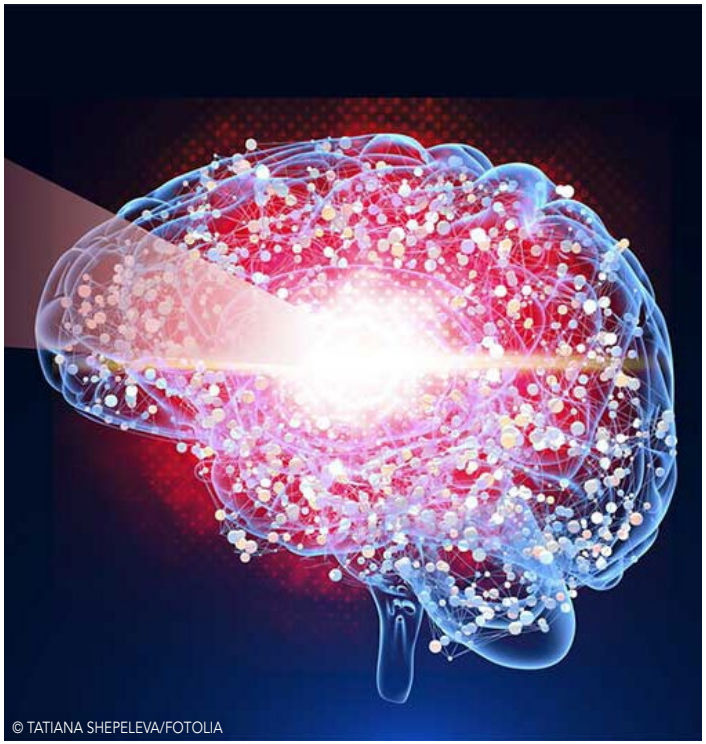
leti
cea tech

2022
HIGHLIGHTS
JANUARY–JUNE


© TATIANA SHEPELEVA/FOTOLIA

HUMAN HEALTH

Clinatec endowment fund hires new neuroillumination researchers

The Clinatec team is growing and research on infrared illumination therapy is intensifying: Australian scientist John Mitrofanis, internationally renowned for his work on neurodegenerative diseases and infrared light, was hired. An international advisor, Dr. Pierre Magistretti from Switzerland, has also been hired.

AGRICULTURE

CEA-Leti helps farmers detect when cows are about to ovulate

Did you know that farmers use visual observation? CEA-Leti unveils a painless ear patch that can detect hormone fluctuations in cows.


© EMIL/ADOBESTOCK

MANUFACTURING

SET, from the French Alps to the World

Discover SET Corporation's success story, a Savoy-based company that offers flip-chip bonders worldwide. This CEA-Leti and IRT Nanoelec partner recently signed an agreement with SUSS MicroTec to develop their NEO HB flip-chip machine for die-to-wafer (D2W) hybrid bonding. A prototype of this SET's machine was installed in CEA-Leti's cleanrooms.


© A.AUBERT/CEA

HUMAN HEALTH

Microfluidic chips testing biomaterials for personalized implants

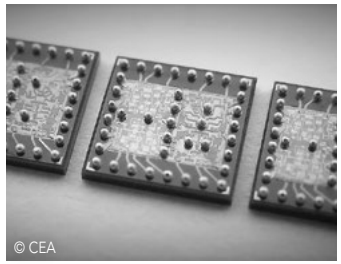
CEA-Leti helped designed an instrumented microfluidic chip that tests several potential biomaterials on a cell sample from the patient.


©IMPACT PHOTOGRAPHY/ADOBESTOCK

› **Leti Photonics Workshop 2022: Hardware enabling photonic applications**
Discover the latest photonic technologies that will empower the next generation of sensors, artificial intelligence circuits, augmented reality, imagers. Download presentations!

› **Cybersecurity, Computing: Discover the power of quantum photonics**
PhotonicsWest 2022—
Learn more about CEA-Leti's quantum-photonics platform. Watch the video.

› **Discover InjectPower's rechargeable millimeter-sized microbatteries for implantable medical monitoring devices**
CES 2022—The problem with implantable medical monitoring devices for organs like the "eye, or heart, is that the power sources are often larger than the actual sensors! CEA-Leti's startup Injectpower tackles this challenge.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SCIENTIFIC EXCELLENCE

Discover CEA-Leti's competitive advanced packaging technology for heterogeneous SiP

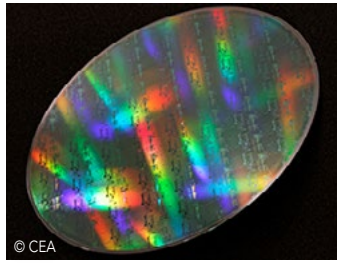
From design fabrication down to UBM level, CEA-Leti offers extensive expertise in fan-out wafer-level packaging to industrial partners on the lookout for competitive heterogeneous system-in-package (SiP) solutions.


© S.FERRARO/CEA

HUMAN HEALTH

Odile Allard revolutionizes thyroid surgery to fight cancer

Former IT engineer, she first conducted a feasibility study within CEA-Leti, in close collaboration with Philippe Rizo, research director. Then in 2009, she founded Fluoptics.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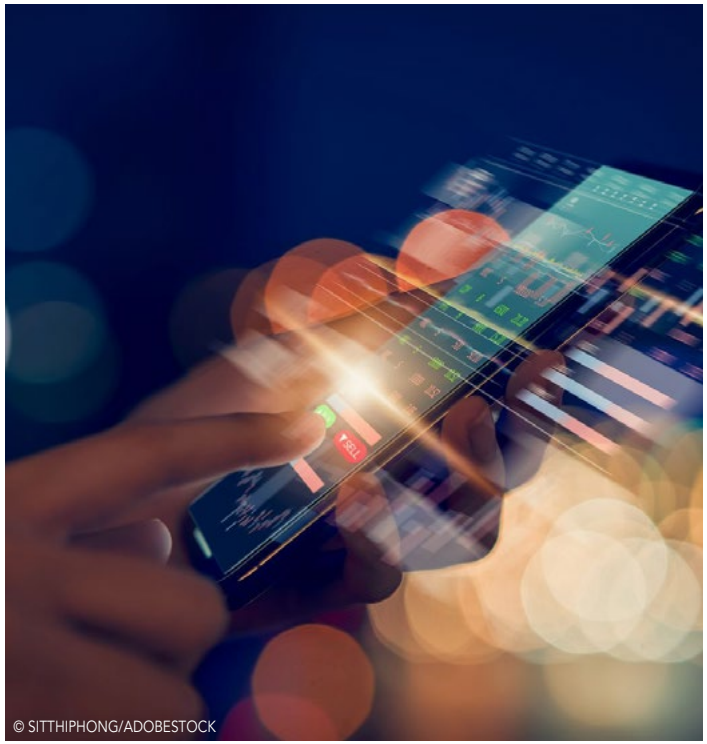
MANUFACTURING

Advanced in high-performance photonic chips

CEA-Leti has been developing photonics on silicon nitride for several years now. Today, the technology is mature enough to address growing demand for high-performance chips…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TELECOM

FD-SOI Empowering the Next Generation of Smartphones

Google recently introduced the French FD-SOI technology in its brandnew Pixel 6 smartphones. FD-SOI was born in CEA-Leti, Grenoble, a few decades ago. CEA-Leti's experts explain the advantages of FD-SOI technology for smartphone and networks.

© FREEPIK/CEA

REPORT

CEA-Leti unveils its 2021 scientific report and trends that will shape 2022

The chip shortage has provided an extraordinary boost to semiconductor R&D. Download CEA-Leti's Scientific Report 2021 to learn on the latest R&D available!

HUMAN HEALTH

CEA-Leti's PhD sheds new light on acute stress with off-the-shelf sensors

A CEA-Leti PhD student tried to determine whether acute stress can be detected and assessed using an explainable and interpretable "white box" method.


© BILLIONPHOTOS.COM/ADOBESTOCK

HUMAN HEALTH

Europe helps people who have lost their sense of smell

Did you have Covid19 and lost your sense of smell ? EU-funded Rose project intends to make patients' lives better with a one square centimeter artificial nose that detects 16 or 64 families of smells.


© STNAZKUL/ADOBESTOCK

OPTICS

Sylvie Menezo is pioneering future high-speed transmissions for data centers with Scintil Photonics

Discover Sylvie Menezo's career, from industry and research to entrepreneurship! While at CEA-Leti, Sylvie identified an optical communication technology capable of significantly accelerating data exchange speeds within data centers.


© LIDIIA/ADOBESTOCK

› **Unlocking smartphones upon face recognition for a few additional micro Watts?**
It's now possible with CEA-Leti's new autonomous imager μWAI. μWAI activates any device upon recognition of a specific pattern—e.g., unlocking a smartphone upon the recognition of a face.

› **Diabeloop shifts into high gear in France and around the globe**
Diabeloop obtained French national health insurance approval for its DBLG1 closed-loop automated insulin therapy device (DBLG1) in September.


© BLUE PLANET STUDIO/ADOBESTOCK

TELECOM

CEA-Leti and Spectronite unveil the highest level of spectral efficiency

CEA-Leti successfully transfers spectrally highly efficient waveform technology to French startup Spectronite
CEA-Leti supports Europe's sovereignty in telecom.


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HUMAN HEALTH

One step closer to human organs-on-chips

The ability to maintain human cells and organoids (which replicate the functioning of in vivo organs) in culture could help advance personalized medicine and provide an alternative to animal testing.


© CEA

HUMAN HEALTH

Congratulations to Sylvain Trigueros for his 2021 best Poster Award!

CEA-Leti's experts work into developing detection devices using in order to improving bacterial viability detection of pathogenic bacteria in the food industry.


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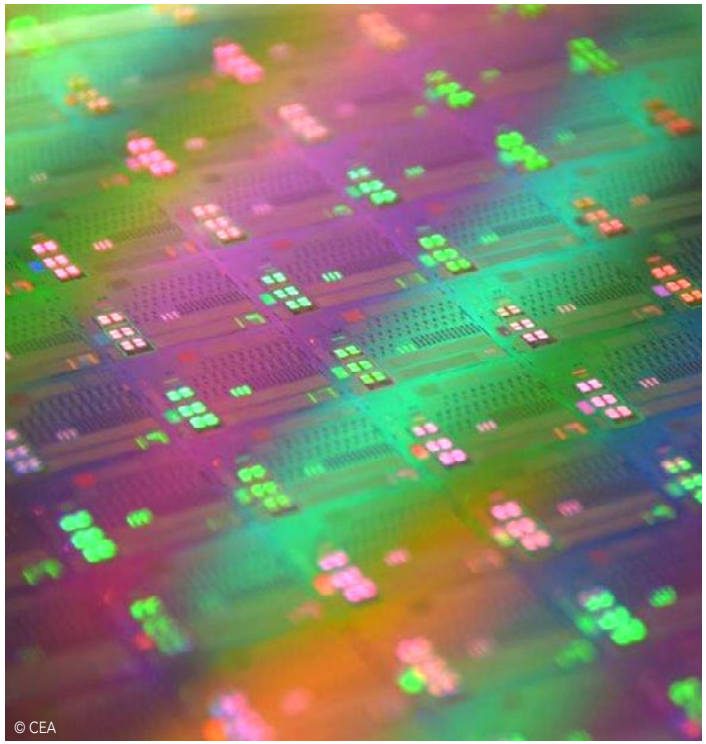
EDGE IA

CEA-Leti researcher Elisa Vianello receives a €3 M EU grant to build the next gen. memory devices inspired by insect nervous systems

How are crickets and memory devices related?
Elisa Vianello discovered that different functions of the insect's nervous system closely resemble functions performed by deterministic, probabilistic, volatile and non-volatile memories.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MEMORY

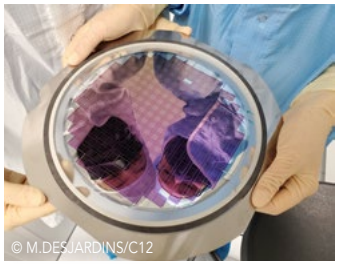
CEA-Leti engineers are working on a joint project to improve ReRAM memories resistance

CEA-Leti unveils its latest results for low-cost Lidars that will benefit society and make industry more efficient: autonomous vehicles; holographic displays; biomedicalImaging... and many other applications.

QUANTUM

CEA and C12 Quantum Electronics announce a partnership to produce the first multi-qubit chips at wafer scale

Building on the breakthrough of manufacturing quantum chips on 200mm silicon wafers using CMOS processes, C12 is pursuing the next materials leap in quantum computing: using carbon nanotubes to build quantum bits.


© M.DESJARDINS/C12

ECO-INNOVATION

Discover SELF-e, standalone, wireless, battery-free switch

SELF-e helps switches generate their own energy using energy harvesting, which recovers mechanical energy, that is placed inside. This innovation is integrated into different device ranges in the Legrand brand.


© BRIZMAKER/ADOBESTOCK - LEGRAND

QUANTUM

Quantum sensors, measurement devices with unrivaled precision

While quantum computers have become the Holy Grail in the quantum field, there is a much more advanced branch which harnesses the same properties, that of quantum sensors.


© SAKKMESTERKE/ADOBESTOCK

› **Fashion industry: No more bulky RFID tag, Primo1D integrates RFID into a textile thread!**
Primo1D, a CEA-Leti startup, is industrializing a radiofrequency identification (RFID) technology in thread form, baptized E-Thread.

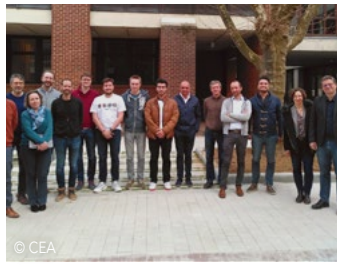
› **Leti Healthcare Workshop**
Discover the latest µtechnologies for bioproduction and in-vitro diagnostics. Biochips, integrated biosensors, automated systems and photonic technologies… discover the future of drug research, bioprocess optimization and medical diagnostics!
Watch the replay!


© SHUTTER DIN/ADOBESTOCK

HUMAN HEALTH

Greenhouse gases could soon be monitored with LiDAR

In research for the H2020 Holdon project, CEA-Leti helped develop a photonic detection system that meets the requirements of space missions for observing greenhouse gases CO2 and methane.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PARTNERSHIP

CEA-Leti and UCLouvain unveil a 3-year partnership on hardware technologies

Under the agreement, CEA-Leti and Université catholique de Louvain will work together to drive innovation in telecommunications (including 5/6G antennas), computing beyond Moore's Law and biotech with modular electronics.


© PICKUP/ADOBESTOCK

ECO-INNOVATION

Can we extend our mobile device lifespan?

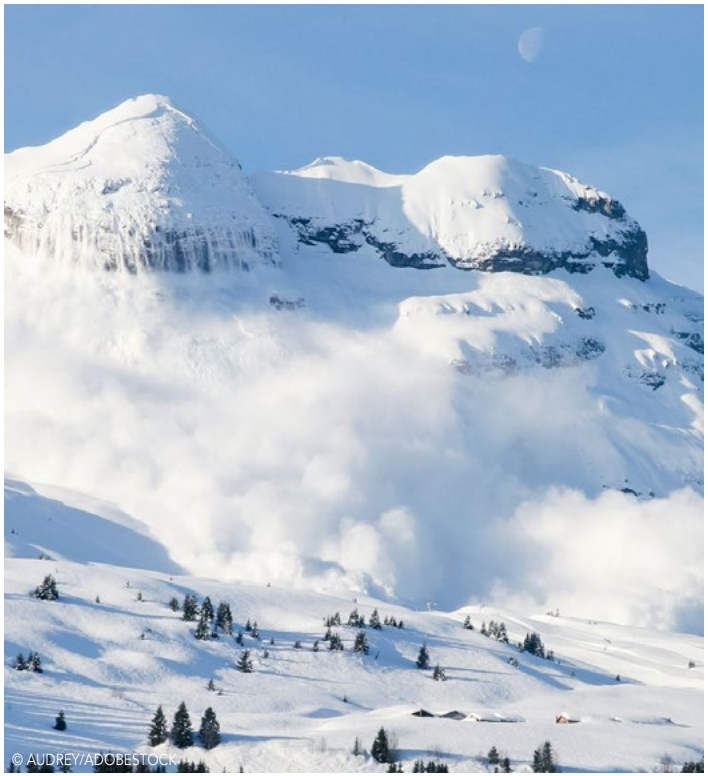
Louis Gerrer develops a new algorithm leveraging machine learning to pioneer a new parameter extraction methodology that could quantify wear at an early stage during circuit's manufacturing process. Louis Gerrer recently received the Best Paper Award at IRPS 2021!


© A.AUBERT/CEA

MANUFACTURING

Leading semiconductor players join forces to migrate to lower nodes to better serve the Automotive, IoT & Mobile industries

CEA, Soitec, GlobalFoundries and STMicroelectronics have announced a new collaboration in which they intend to jointly define the industry's next generation roadmap for FD-SOI (fully depleted silicon-on-insulator) technology.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SAFETY

Triggering controlled avalanches from a safe distance

Moutain Planet 2022—CEA-Leti to exhibit at a wireless networked detonator originally developed for the mining industry, to allow ski patrol members to trigger controlled avalanches from a safe distance.

CYBERSECURITY

Discover SecWay, a secured gateway for protecting sensitive data

SecWay is a data gateway secured by design which guarantees the privacy and integrity of data exchanged between unsecured connected objects and distant servers (Cloud). SecWay will be deployed as part of the European projects GateKeeper and DigiFed.


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PATENTS

World Intellectual Property Day: CEA in the world top 5 for semiconductor patents!

The European Patent Office (EPO) released earlier this month its annual report called "Patent Index 2021" that lists global patent applications on the European market: CEA is the only European RTO in the top 5 for semiconductor patents.

© CEA

HUMAN HEALTH

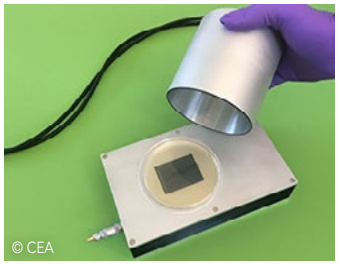
Discover CEA-Leti's latest microfluidic technology that performs biological analysis on the go

FlowPad features disposable, credit card format microfluidic cartridges with fluidic channels designed to perform a selection of tests outside of a traditional lab environment.


© CEA

› **Don't miss CEA-Leti eco-innovation program manager's interview...**
Léa Di Cioccio, head of CEA-Leti eco-innovation program, is committed to boost eco-innovation adoption in 2022.

› **Swedish Getinge completes acquisition of Fluoptics**
In April, Getinge announced an agreement to acquire Grenoble-based Fluoptics, a leader in fluorescence imaging as an aid to surgery.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HUMAN HEALTH

Healthcare in Africa: new rapid, robust & affordable microbial identification device

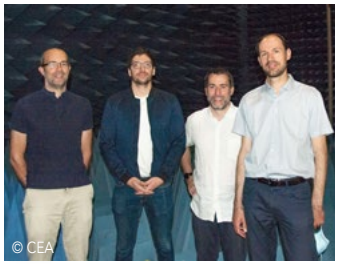
Mass spectrometry techniques used to identify bacteria require expensive equipment. CEA-Leti & CEA-Irig helped pioneer a fast, effective, and affordable diagnostic device based on their lensless imaging system as part of the EU Simble project.


© KIRICHAIE/ADOBESTOCK

AUGMENTED REALITY

Integrated photonics: Could VR glasses soon look like eyeglasses?

CEA-Leti develops photonic circuits on transparent substrates… Near-eye display technologies are garnering increasing interest as a solution for augmented reality.


© CEA

TELECOM

Congratulations to the Astrid Meadurement team for their IEEE AP-S Ulrich L. Rohde Award 2021!

Our team came up with a new process that maps echoes and minimizes them. They can now measure and map antenna radiation patterns regardless of the size of the anechoic chamber.


© JAMESTEOHART/ADOBESTOCK

COMPUTING

Edge Computing: 3D phase change memory could soon become a reality

CEA-Leti is committed to advance phase change memory (PCM) technologies, including for automotive applications. PCM, with its high programming speeds and low operating voltages, is currently the front runner in the race to replace flash memory.

› **Diabeloop secures €70M**
Diabeloop obtained French national health insurance approval for its DBLG1 closed-loop automated insulin therapy device (DBLG1) in September. Now the Grenoble start-up and long-time CEA-Leti partner is training hospital staff so that they can offer the DBLG1 to their diabetic patients.


© NOMAD_SOUL/ADOBESTOCK

HUMAN HEALTH

Breast Cancer: New imaging techniques to avoid painful biopsies

CEA-Leti supports non-invasive breast cancer screening strategies with 2 new imaging techniques: ultrasound and optical. Currently, most breast cancer screening involves imaging—a breast ultrasound—and, if anything suspicious is detected, a painful biopsy. However, a non-negligible percentage of breast biopsies turn out to be negative.


© P.JAYET/CEA

POWER ELECTRONICS

New 100V-800V multifunctional GaN components deliver increased energy efficiency

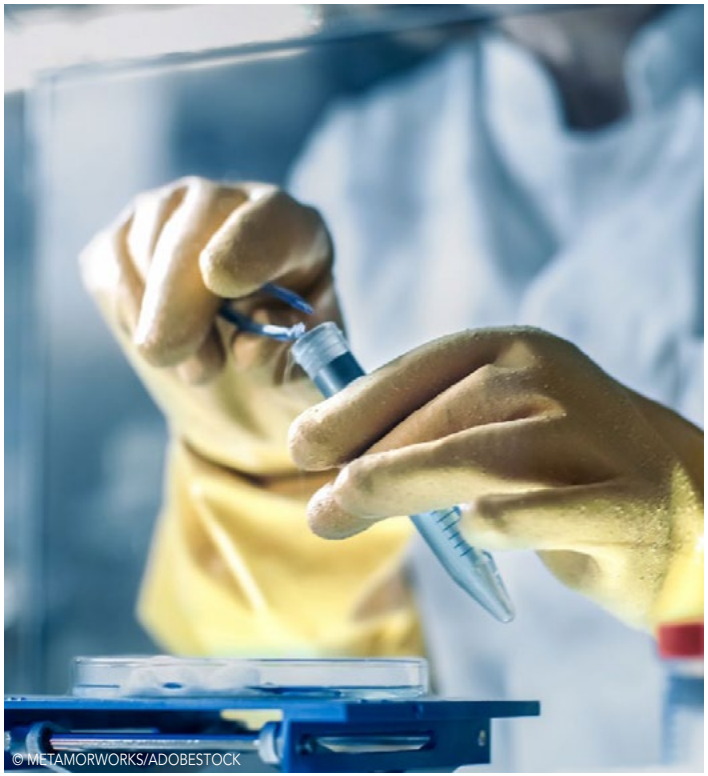
A new process design kit (PDK), the most comprehensive on the market, will help support GaN/Si development.


© GERMINA/ADOBESTOCK

ECO-INNOVATION

Ecodesign: a paradigm shift for more reliable, longer-lasting ICs

CEA-Leti has leveraged machine learning and other techniques to develop component aging models. The goal? To extend integrated circuit lifespans.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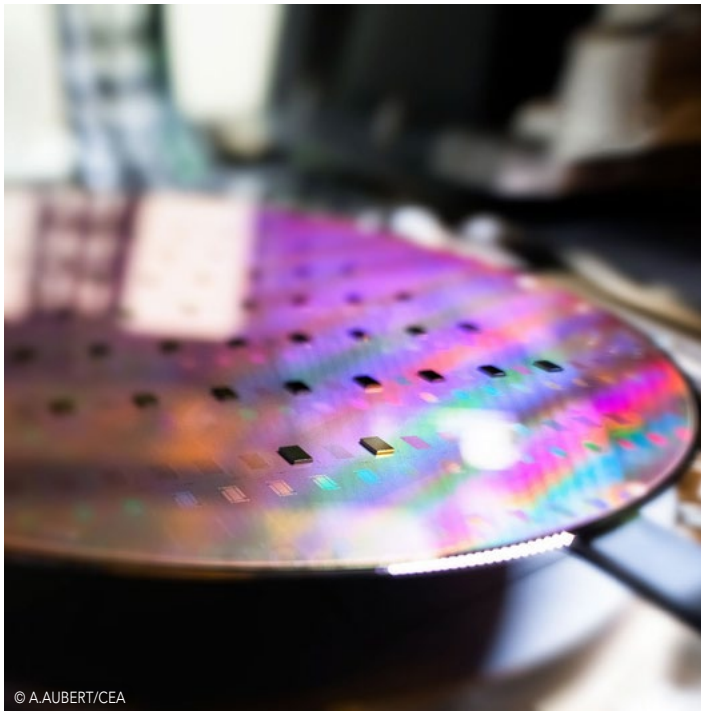
HUMAN HEALTH

Crohn Disease: Toward a new treatment for chronic inflammatory disease

Researchers collaborating within the European project New Deal have developed an unprecedented therapy for treating chronic inflammatory bowel diseases such as Crohn's disease. The initial results, from in vitro and pre-clinical tests, are promising.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MANUFACTURING

Bonding: CEA-Leti & Intel unveil die-to-wafer self-assembly breakthrought using water

CEA-Leti and Intel unveil a breakthrough using water for the future of die-to-wafer bonding with the potential to increase the alignment accuracy and fabrication throughput by several thousand dies per hour… Water is an excellent candidate for self-assembly process. The approach uses capillary forces of a water droplet to align dies on a target wafer.

INDUSTRY 4.0

Discover PreCOM: Monitoring wear on power tools

To support manufacturing, CEA-Leti has developed PreCOM, an ultra-low-power and robust system that identifies tool wear and their remaining life.


© DACO_ADOBESTOCK

PARTNERSHIP

CEA-Leti and EPFL join forces on key societal innovations

Because innovation has an impact on so many different parts of our society, CEA-Leti and EPFL experts pool their resources to pioneer disruptive human-centered innovation from cybersecurity, computing to medtech.

HUMAN HEALTH

Weighing particles to the nearest attogram

CEA-Leti is working with MIT on new sensors capable of weighing the tiniest individual particles to provide valuable information about their nature. The Sensors could ultimately be used in the early detection of cancer.


© BEEBOYS/ADOBESTOCK

› **Scintil Photonics raises €13.5M**
Scintil, a CEA-Leti startup, develops silicon-based photonic integrated circuits and creates high-speed optical transmission solutions. These are essentially intended for data storage centers, high-performance computing, and 5G.

› **CEA-Leti welcomes 3 international researchers specializing in affective computing…**
Affective computing is about analysing cognitive state, facial expressions, gestures, tone of voice—among other physical parameters. The goal is to have tech appliances respond intelligently to natural human emotional feedback.


© IMMIMAGERY/ADOBESTOCK

CYBERSECURITY

Dicover SecloT, an ultra-secure device for critical IoT

SecloT integrates an enhanced arsenal of hardware and software security features. It simultaneously ensures object authentication and protection of sensitive data in terms of confidentiality and integrity.


© CEA-ANATOLY/ADOBESTOCK

DISPLAY

Congratulations to Lucile Arnaud's team for their 2021 3DIC Best Paper Award!

A bright future for smart screens! CEA-Leti's experts developed a CMOS process to manufacture high-performance microLEDs. To support this new technology, they came up with a new hybrid bonding technique.


© CEA

HUMAN HEALTH

Active micro-needles: Measure biological parameters and cure

Less invasive than traditional needles, micro-needles reach the deep layers of the epidermis to deliver drugs, measure physiological characteristics, or send light to specific wavelengths.

© E.TOLWINSKA/CEA

EVENT

Leti Innovation Days 2022: Next generation electronics to drive your business' value up

This year, we are proud to announce that
- 700+ guests from18 countries attended
- 200+ business meetings were scheduled
- 100+ keynoters provided amazing tech content to our audience

Watch the replays!


© GORODENKOFF/ADOBESTOCK

HUMAN HEALTH

ONWARD Awarded European Innovation Council Grant to Develop Brain-Spine Interface Technology

ONWARD will support development of Brain-Spine Interface (BSI) technology to restore mobility and upper limb function in people with spinal cord injury. The consortium will use the EUR 3.6M grant proceeds to fund integration between ONWARD's ARCIM Therapy, and Clinatec's WIMAGINE.

HUMAN HEALTH

Improved precision for certain brain tumor removal surgeries

Atomic force microscopy was used to identify new markers, independent of conventional imaging, that can help delineate pituitary adenomas for more accurate removal.


© ROMASET/ADOBESTOCK

SENSING

Discover CEA-Leti's high-end loudspeakers for smartphones & small appliances

CEA-Leti is going a step further into making loudspeakers compatible with micro-fabrication processes with a new piezoelectric micro-loudspeaker using almost exclusively silicon.


© LUCKYSTEP/ADOBESTOCK

TELECOM

Spectronite introduces a high-performance 5G wireless solution for mobile operators

Spectronite turned to CEA-Leti to boost the spectral efficiency of its wireless point-to-point backhaul solutions for 5G networks. Operators will now be able to serve more users simultaneously with the same capacity or give users more capacity.

© ASIRAJ/ADOBESTOCK

› **Remedee Labs endorphin stimulator granted with FDA breakthrough device status**
A CEA-Leti spin-off, Remedee Labs provides an answer to chronic pain to improve patients' quality of life. Recently, the startup introduced a product named Remedee Well, that helps fibromyalgia patients managing their pain.

› **Cleanrooms**
Dive into CEA-Leti's world-class semiconductor cleanromm

QUANTUM

VLSI: Invited CEA-Leti paper boosts industrialization of Si Quantum Computing

CEA-Leti, Irig and CNRS unveil a "Powerful Step Towards Industrialization" at VSLI Symposium.

AUTOMOTIVE

CEA-Leti introduces a new generation of 100kW+ electric powertrains for electric and hybrid vehicles

The ModulED (Modular Electric Drive) simultaneously offers high power density, leveraging a compact powertrain that is fully built into the engine block.

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cea-leti.com

ENERGY

GaN/Si micro-inverter reduces cost per watt of solar power

Regular silicon-based micro-inverters—the most critical components to improve solar panel performance—have reached their limits. CEA-Leti researchers are now offering 650V & 100V GaN/Si power transistors to reduce the cost of solar power while increasing compactness.