

# **EMERGING MATERIALS AND PROCESSES**

## **FOR NANOTECHNOLOGIES AND MICROELECTRONICS**

Advanced materials and processes are essential for device development and enabling innovation. The miniaturisation of microelectronic devices and diversification in terms of applications and even computing paradigms (quantum and neuromorphic) drives the need for new materials and the processes needed to produce them.

For example CEA Tech is developing specific low temperature processes to enable 3D sequential integration without degrading the previously deposited devices. New approaches are being developed for

advanced lithography in order to produce finer features and emerging materials are being integrated for memory elements, More-than-Moore applications, sensors and optoelectronics. This is done in the frame of the societal challenge of energy efficiency: the sourcing of materials, the device fabrication and the end-use should use as little energy as possible and have minimum environmental impact.

These activities are carried out in synergy with the development of advanced nanocharacterization techniques suited for small complex devices.

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## **WHY A PHD RELATED TO CYBER PHYSICAL SYSTEMS – SENSORS AND ACTUATORS AT CEA TECH?**

The successful PhD candidate will join a team of over 1800 people at the CEA-Leti institute in Grenoble working together to produce advanced technology solutions. The institute has around 300 ongoing PhD projects out of which 50 are dealing with emerging materials and processes.

The CEA-LETI is home to four world class technology platforms that cater for a wide range of devices from CMOS, to MEMS to display technology as well as advanced nanocharacterization. These

platforms allow devices to be developed, prototyped, and even manufactured in small volumes on wafers sizes up to 300 mm. The nanocharacterization platform and the close proximity of large-scale characterization facilities such as the ESRF Synchrotron and the ILL neutron facility provide unique possibilities for advanced materials analysis.

The CEA-LETI is part of the Grenoble Alps University and has close ties to other international academic labs. It has an

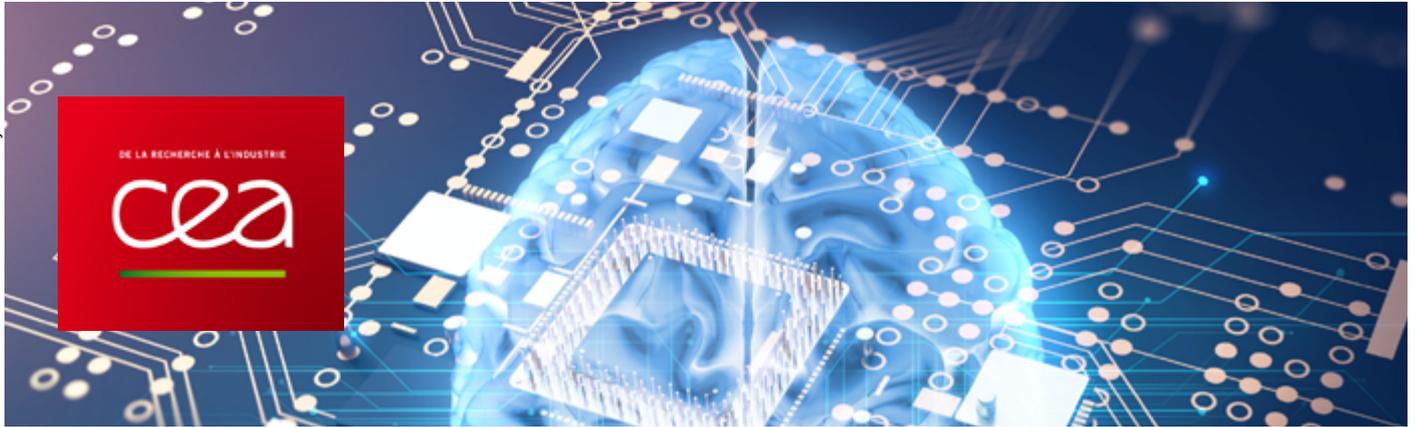
impressive track-record of industrial partnerships and start-ups. The candidate will have the opportunity to interact and learn from internationally recognized experts both from the CEA-LETI and global industrial partners.

If you are looking to work at the forefront of advanced semiconductor technology, the unique environment at the CEA-Leti will help you get your career off to a great start.



CEA-Leti Institute in Grenoble Alps

50 ongoing PhD projects



# CEATECH SCIENTIFIC AND TECHNOLOGICAL CHALLENGES

CEA Tech tackles the three key and ongoing transitions of the 21st century: numeric, energy and medical ones. For each, CEA Tech research teams innovates within a vibrant network of academic and industrial partnerships, to develop the technologies of the future.

CEA Tech, one of the four CEA research divisions, relies on three large research Institutes, two in Grenoble, Leti and Liten and one in Saclay, List, and a network of technology transfer facilities in Bordeaux,

Nantes, Toulouse, Metz, Cadarache and Lille. Close to 500 young researchers, prepare their PhD in CEA Tech Labs, with a major contribution to the research teams. They share the successes of the CEA, embodied in leading publications, patents, technology transfers to industry, business and start up creation. For years, Reuters ranks CEA as one of the top three most innovative research organizations in the world (1st, 2nd or 3rd).

## WHY A PHD AT CEA TECH?

Regardless of the field of research you are looking for, willing to explore prospective ideas or to further advanced technologie, you will likely find among CEA Tech doctoral positions the one that meets your expectations.

Then you can join either Leti (1800 p.) and focus on micro and nanotechnologies, embedded electronics, communications, components for the Internet of Things (IOT), cybersecurity, medical devices and healthcare outpatients (at Clinattec) - or Liten (950 p.) to face the challenges of non-CO2 emitting energies (solar, batteries, hy-

drogen, biomass or smart grids) - or List (750 p.) to innovate in terms of data intelligence, cybersecurity and IOT software, manufacturing (4.0 industries), radiotherapy, health data processing - or a research team located in one of the technology transfer facilities (Bordeaux, Nantes, Toulouse, Metz, Cadarache and Lille).

Whatever the topic you select, whatever the career path you envision, joining CEA Tech for your PhD has a deep meaning. On the one hand, you will be dealing with one major societal challenge, deeply rooted in science

and technology. On the other hand, your PhD will be at the heart of highly innovative ecosystems, each offering unique opportunities in research and career paths.

Indeed, CEA Tech offers a highly efficient mix of digital and hardware skills, world-class facilities such as state-of-the-art 300 mm clean rooms, and integration facilities for hydrogen and battery technologies, and many others. CEA Tech's teams form active partnerships with other research organizations and universities, as well as active cooperation with more than 500 industrial partners in France, Europe, North America and Asia.

We will do our best to accompany your success.



CEA-List Institute in Paris Saclay or CEA-Leti Institute in Grenoble Alpes or CEA-Liten Institute in Grenoble Alpes



500 ongoing PhD projects