



ADVANCED HYDROGEN & FUEL CELLS SOLUTIONS FOR ENERGY TRANSITION

In order to implement new sustainable energy policies, hydrogen appears as a key energy vector either for renewable energy source integration in future smart grids or for mobility or stationary applications. As green hydrogen production will be mandatory to limit the carbon footprint associated to its production, the main research activities focusses on the development of new electrolyser generation at low temperatures (alkaline or PEM electrolysers) or high temperatures (Solid Oxide electrolysers). Hydrogen transport and storage are also key challenges as well as its conversion in power and heat. For hydrogen conversion, different technologies of

Fuel Cells are developed. Most of research activities focusses on Proton Exchange Membrane Fuel Cells (PEMFC) or Solid Oxide Fuel Cells (SOFC) for new generation of hydrogen vehicles or for Combined Heat and Power (CHP) generators.

The key scientific challenges can be found at each step of the value chain from material development such as new catalyst without noble metals, new and innovative disruptive solution for components for fuel cells and electrolysers to more efficient system architecture including hybridization with other components of the power chain like renewable energy sources, battery, power electronics....

WHY A PHD RELATED TO ADVANCED HYDROGEN & FUEL CELLS SOLUTIONS FOR ENERGY TRANSITION AT CEA TECH?

PhD students at CEA Tech will have the opportunity to get involved in the whole value chain for research and development on electrolysers and Fuel Cells from new innovative materials and components to integrated systems tested in real operating conditions. More specifically they will benefit from the experience developed in the following areas:

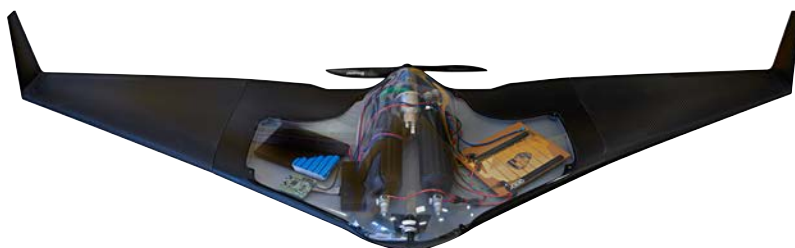
- Design and production of new

materials, components and integrated systems from lab scale to pilot lines;

- Advanced characterisation and test of materials, components, sub-systems and prototypes using dedicated test benches but also the CEA Tech Nano-characterisation platform and Large Scale Facilities such as ILL for neutron scattering or ESRF for X-Ray ana-

lysis located in Grenoble;

- Simulation of components, sub-systems and prototypes thanks to a CEA multi scale and multi-physics modelling platform. PhD students will be part of highly recognized research teams (about 80 p.) featuring major implication in European H2020 projects and involved in strong industrial partnerships.



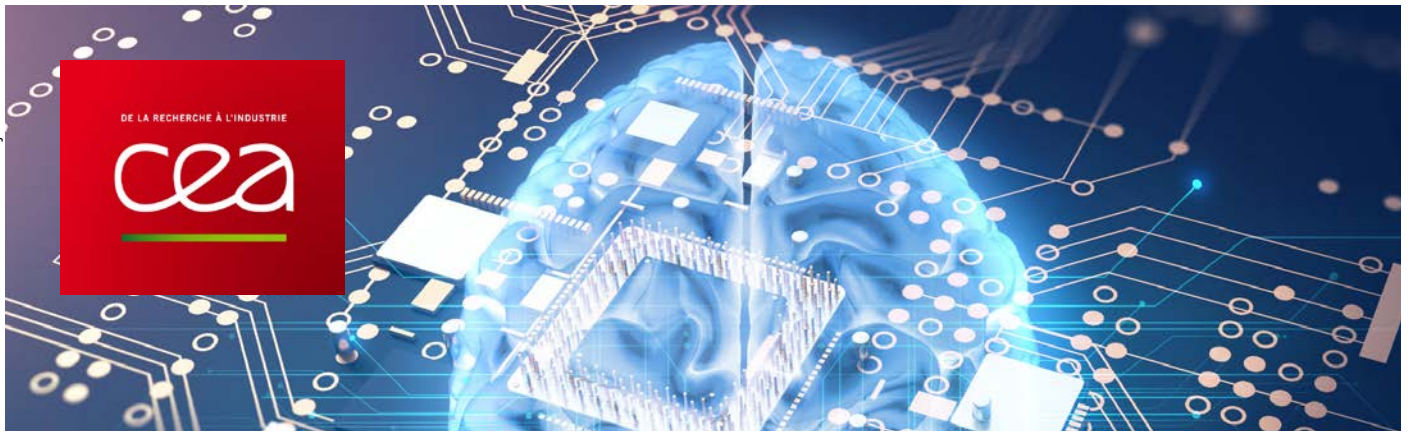
Drone with hybridized power chain with a battery pack, fuel cell and hydrogen storage



CEA-Liten Institute in Grenoble Alpes



25 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 Clinatéc) - 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