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 focus 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 focuses 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....

**ADVANCED HYDROGEN & FUEL CELLS SOLUTIONS FOR ENERGY TRANSITION**

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 analysis 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.

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

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

25 ongoing PhD projects