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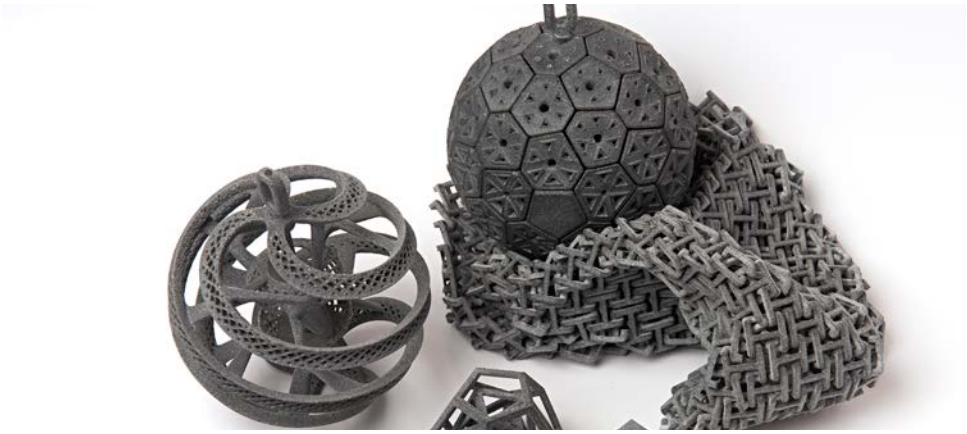

ADDITIVE MANUFACTURING,
NEW ROUTES FOR SAVING MATERIALS

Additive manufacturing (AM) radically changes the paradigm of industrial parts production. Basically, AM allows 3D models from CAD to be promptly built by assembling layer after layer the base material. Initially intended for prototyping or tooling, AM is rapidly enlarging to the direct manufacturing of complex components, not only in the aerospace and medical fields, but also in the automotive and other industrial sectors. AM offers large opportunities for saving materials thanks to the inherent efficiency of the additive processes, the capability of obtaining optimized geometries and creating lightweight components. These features combine advantageously with other routes also investigated by CEA Tech for material savings (recycling, material substitution).
Materials science research is intense at CEA-Tech to obtain diversification of the input materials, reduction of their costs and reuse in short cycles. The addressed AM processes (Laser Powder Bed Fusion, Stereolithography and Binder Jetting) are all powder-based processes. Moreover, research activities are growing up to produce new materials by AM liable to substitute to critical materials by a better control of the metallurgy and to develop high properties materials. Scientific works focus on attractive alloys which are difficult to be produced by conventional casting/ subtractive process but become compatible with AM thanks to a larger process parameter window.
The challenge for AM is to contribute to a sustainable manufacturing model by combining reduction of consumed resource, direct waste recycling, shorter supply chains and relocation of production. Thanks to its versatility, it is worth noting that AM is also going to play a decisive role in Industry 4.0.

WHY A PHD RELATED TO ADDITIVE MANUFACTURING & NEW ROUTES FOR SAVING MATERIALS AT CEA TECH?

The CEA-Tech is well aligned for this challenge by implementing large technological platforms devoted to AM research activities. Up to date 3D printing equipment is available to handle metals, ceramics and polymer materials from small to large parts.
The research activities are largely transverse and benefit from internal expertise in material characterization, materials science, real time monitoring, numerical simulation and material non-destructive testing or cyber-secured digital workflow. Development are also assessed with the LCA (Life Cycle Analysis) methodology to anticipate the environmental impact of the AM processes. Recently, two European H2020 projects, Maestro and Supreme, have tackled this topic. CEA Tech is also deeply involved in EU projects aiming at the reduction, the reuse and the substitution of critical materials, such as rare earth elements (Novamag, REE4U) or platinum group metals, required for the development of new technologies for energy (photovoltaic, batteries, permanent magnets).

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

30-35 ongoing PhD projects

CEATECH SCIENTIFIC AND TECHNOGICAL 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 Clinatec) - or Liten (950 p.) to face the challenges of non-CO2 emitting energies (solar, batteries, hydrogen, 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