Disruptive products and innovative technology transfer

Technological innovation and disruptive new products and services are often coming from new enterprises and start-up companies which have new ideas to solve old problems or to invent complete new methods to tackle future tasks. The emergence of such new firms is important for the industry as they represent the next generation of high-tech companies. In France the Carnot research institutions are strongly supporting this activity transferring technology to the industry and helping startups to get a foothold on the market.
This year, the Rendez-vous Carnot event is launching a new opportunity for ambitious companies looking to tackle tomorrow's major challenges. It is aimed at innovative PME (petites et moyennes entreprises) firms and start-ups developing disruptive solutions. Leading industry players invite them to take on a business challenge designed to accelerate connections and pave the way for mutually beneficial collaborations.
The Carnot organization, which comprises 39 Carnot Institutes with excellent research labs and their respective research partners, is established of the French state with the main purpose to transfer technology from the public research to the industry. In France the Carnot network represents 55% of the public and private research, and the Carnot label distinct superb excellence for the public research institutes active in transferring technology and innovation to the enterprises.

Some examples are mentioned in the following from the Carnot Rendez-Vous (RDV) conference 2025 in Lyon.

Breakthrough technology for instant and ultra-sensitive immunoassays in less than one minute is a disruptive innovation from French Biocellis, a deep-tech start-up based in Grenoble. The company is pioneering a new generation of immunoassays that combine ultra-sensitivity with fast readouts within 60 seconds, and with picogram-level sensitivity and minimal sample preparation. Based on patented research developed over a decade at leading French scientific institutions including Pasteur Institute in Paris the new product enables antigen detection for active infections. It is compact and can be used in serological testing for immune response or exposure testing in hospitals, clinics, airports, workplaces – anywhere.
Biocellis is co-founded by Vincent Poher, PhD, CEO with Institute Pasteur and the leading scientists Thierry Rose, PhD, CSO, and Sophie Goyard.
"Healthcare depends on timely information – but most rapid tests sacrifice sensitivity, and most sensitive tests take too long. In emergencies, during pandemics, or at scale, the world needs diagnostics that are both fast and precise. Sometimes, even a few seconds can make all the difference. Biocellis is closing that gap", underlined Vincent Poher.

An optomechanical sensor from CEA-Leti is the new generation of MEMS technology based on silicon photonics to measure motion with extreme sensitivity and ultra-

rapid response. The new product combines an electromechanical sensor with an optical cavity where the motion of a moving mass generates an optical signal of varying intensity and thus makes the measurement. According to Leti this optoMEMS is 1000 times more sensitive than capacitive sensors and 100 times faster than piezoelectric sensors. The new type of sensor is ideal for portable in-situ mass spectrometry, portable biological sensing, real-time atomic-force microscopy (AFM), and silicon clocks with quarts-like accuracy. This technology also brings new levels of precision and compactness to inertial sensors.

CEA-Leti is well aware that the semiconductor industry faces environmental challenges such as a heavy carbon footprint and is doing a lot to cope with this challenge. The research institute in Grenoble has a sustainability roadmap in their 2030 vision and a strong engagement for sustainable technologies. CEA-Leti is focusing on carbon neutrality, an eco-innovation program, sustainable technologies engagement, and life cycle assessment (LCA) through the entire life of the products or services. This is right from raw materials till the end of process steps in clean rooms. Fifty percent of the total impact of the clean room is on climate change where electricity is the main contributor. Leti's main actions are optimizing laminar flow, reduce overpressure, optimizing cooling and heating. The present results compared to 2021/22 are -20% electricity, -20% gas, -13% cooling, -12% heating thanks to the energy management system.

Artificial intelligence (AI) to the industry is offered from the start up company Micelia in Grenoble. The new firm advises the customers how to integrate and use AI in their manufacturing processes and administration. The company can propose concrete AI solutions based on specific technology favourable to international AI competence.

Micro- and nano-fluidics are complex fluids under flow and flow chemistry and are the focus of scientific progress at the research institute IPGG (Institut Pierre-Gilles de Gennes). The focus of the institute is the challenges for the society, particularly in the fields of health, energy, access to water and environment. Innovations in these strategic areas require major technological and scientific advances, which IPGG masters. The research institute is a global leader within micro-fluid and does research in micro- and nano-fluid applications in order to develop fundamental research for health, energy, agro alimentary, cosmetic etc.
IPGG Microfluidique uses thermoplastic and glass to produce micro-fluid products controlled by microchips. Thermoplastic has good mechanical resistibility and duration, it is sealed with laser and can be produced at large scale. Glass is chemical stable with good mechanical and thermal resistibility, it has optical properties, the surface can be worked on, and glass has very good durability, but cost is high, Micro-fluidic products made of glass are welded by laser, and nonlinear effect (absorption of multi photonics light) augment the sensitivity.

Open innovation at pharma R&D could overcome the several challenges that are faced by R&D pharmaceutical companies, such as patent cliffs due to competition, decreasing probability of success, and increasing R&D spending. To cope with these challenges the Servier Pharma company applies open R&D innovation to accelerate the development with access to disruptive technologies from diverse innovation sources internally and externally. It has a positive impact on patient according to the firm that focuses on oncology & neurology. In their open innovation Servier is using think tank internally and externally, and partnership with industrial enterprises, research community, and start-up community. Servier's mentorship/academy activity helps start-ups to overcome challenges and accelerate their growth in the competitive healthcare industry. Servier gives start-ups some access to the company's R&D equipment to accelerate the new firms. A sandbox provides a streamlined environment for rapid validation

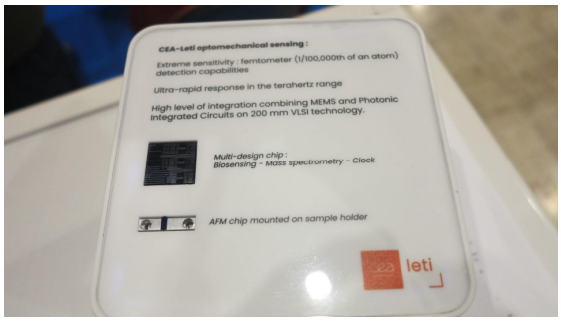
and refinement of innovative early-stage start up solutions to give faster growth, and the incubator matures star-tup R&D in human health.

Intellectuel property (IP) is as old as the human creativity, from homo-sapiens appearance to our time today. What a human invents one seeks to protect and/or increase the value. The IP has always been an instrument to power economically, politically and geopolitically. The IP has been an indicator to some degree for our civilisation technically, economically and symbolically. What you protect is what you value. The proposal from Lyon-based IEEPI (institut européen entreprise et propriété intellectuelle) to the industry is to reinforce the enterprises expertise and know-how in order to be more competitive on the market.
with prizes for their disruptive innovations

Shown from left: Biocellis co-founders Vincent Poher, Sophie Goyard, and Thierry Rose, presenting their new disruptive immunoassay solution

Pierre-Damien Berger, responsible for innovation, CEA-Leti, is here showing the principle of the optical cavity in the new optomechanical sensor


Jean-Denis Muller, directeur générale, Carnot RDV, honoured Biocellis and other high-tech firms



The tiny AFM chip in the opto-mechanical sensor is here the black part in the middle below

Isabelle Servin, correspondante eco-innovation, CEA-Leti, explained Leti's sustainability roadmap

From left: Micelia's Mathieu Poissard, CEO and cofounder, and Tristan Marin demonstrated the possibilities the industry could get when using the AI solutions from the startup company

Izadora Fujinami-Tanimoto, biomedical engineer, Carnot IPGG Microfluidique Explained the principles in IPGG's micro-fluid products made of thermoplastic and glass

Nadia Benallal, directrice adjoint, Servier R&D, explained how open innovation in pharma R&D is working in the health research communities

Anne Grouselle, IEEPI, Lyon, explained how the IP resources have developed during long time over several centuries