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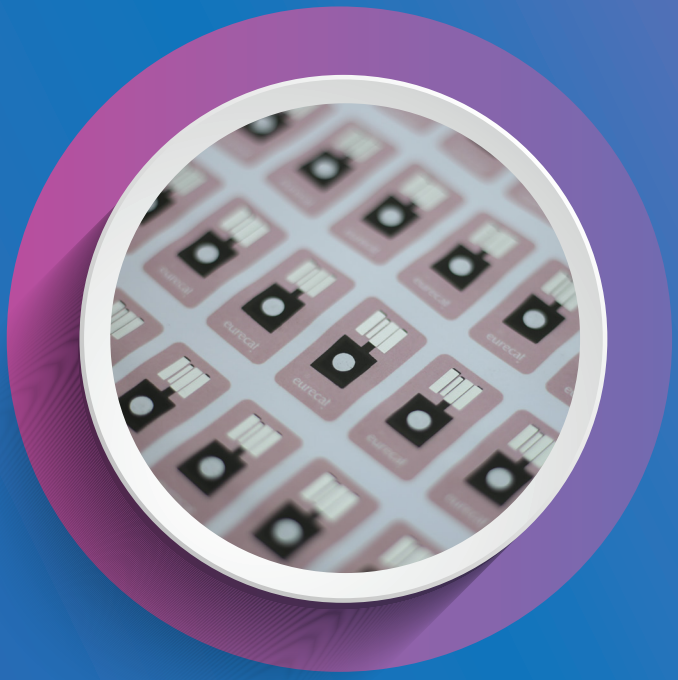


Eurecat, where technological innovation meets Additive Electronics & Embedded Smart Devices

From research to market
for more efficient, productive
and competitive industries.

Talk about
@eurecat_news

The first Plastronics pilot plant in Southern Europe

Eurecat: adding intelligence and functionalities to plastic components. From product concept to industrial production.

Eurecat's Plastronics pilot plant is the first of its kind in the South of Europe.

It is a pioneering platform that has been made available to companies for the purposes of creating and/or improving products, services and processes: from the initial idea to industrial production.

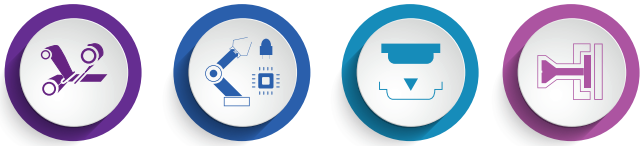
Located in Cerdanyola del Vallès (Barcelona), the plant boasts a series of truly unique facilities.

It consists of two cleanrooms that enable an orderly combination of different manufacturing processes. One is dedicated to printing and electronics, while the other is dedicated to processes involving plastics.

Plastronics, also known as In-Mold electronics (IME), is an emerging technology that combines electronics and plastics to create products that have high added value, advanced functions or features and are manufactured on a large scale.

By combining the functional printing of electronics and the hybridisation of electronic components with traditional plastic transformation processes, such as injection molding, it is possible to create lightweight devices with new functionalities and embed

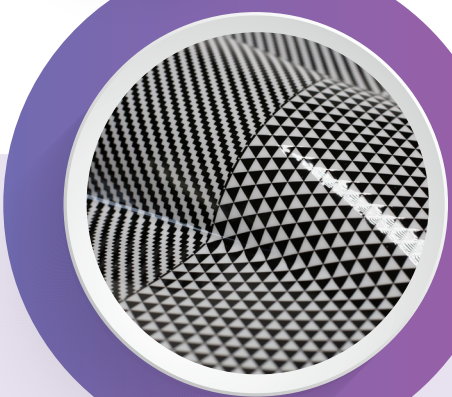
Eurecat offers a complete cycle of plastronics' manufacturing processes



Printing
Additive deposition of inks with electronic properties onto plastic substrates, with the aim of producing functional films containing thin-layer circuits and electronic devices.

Hybridisation
Placement electronic SMDs (surface-mount devices) components onto a functional film using pick and place equipment. A combination of printed electronics and SMD components is known as hybrid electronics.

Thermoforming
Controlled deformation of printed and hybridised sheets into 3D shapes with the use of molds.



Injection
3D films coating with plastic materials by pressure-injecting melted plastic into a closed mold and allowing it to solidify inside.

Plastronics' applications
Plastronics is a revolutionary technology for the automotive, aeronautics, packaging, consumer electronics, medical and sports industries.

- Manufacturing flexible screens and haptic controls that enable interactive responses or invisible buttons.
- Creating plastic products that contain embedded sensors (temperature, pressure, etc.).
- Creating buttons for vehicle interiors.
- Creating user interfaces for domestic appliances.
- Producing geometrically complex and 3D products.
- Producing lighter and smaller components and parts.
- Producing thinner and cheaper parts pieces.
- Creating products from conductive plastics.

Functional Printing & Embedded Devices in products

Functional printing and additive electronics will enable industries such as automotive, household appliances, healthcare, energy, packaging, and textiles to create functional surfaces and smart objects by such as automotive, household appliances, healthcare, energy, and textiles to create functional surfaces and smart objects by printing thin-film devices, embedded sensors, and electronic hybridization. The combination of additive electronics with artificial intelligence embedded in surfaces and objects is allowing the deployment of the Internet of Things (IoT).

Product surfaces are expected to increasingly host communication and user interface functions, as well as sensorization and interaction with the environment as a whole, making printed electronics an important technology to consider.

Printed Sensors & Actuators

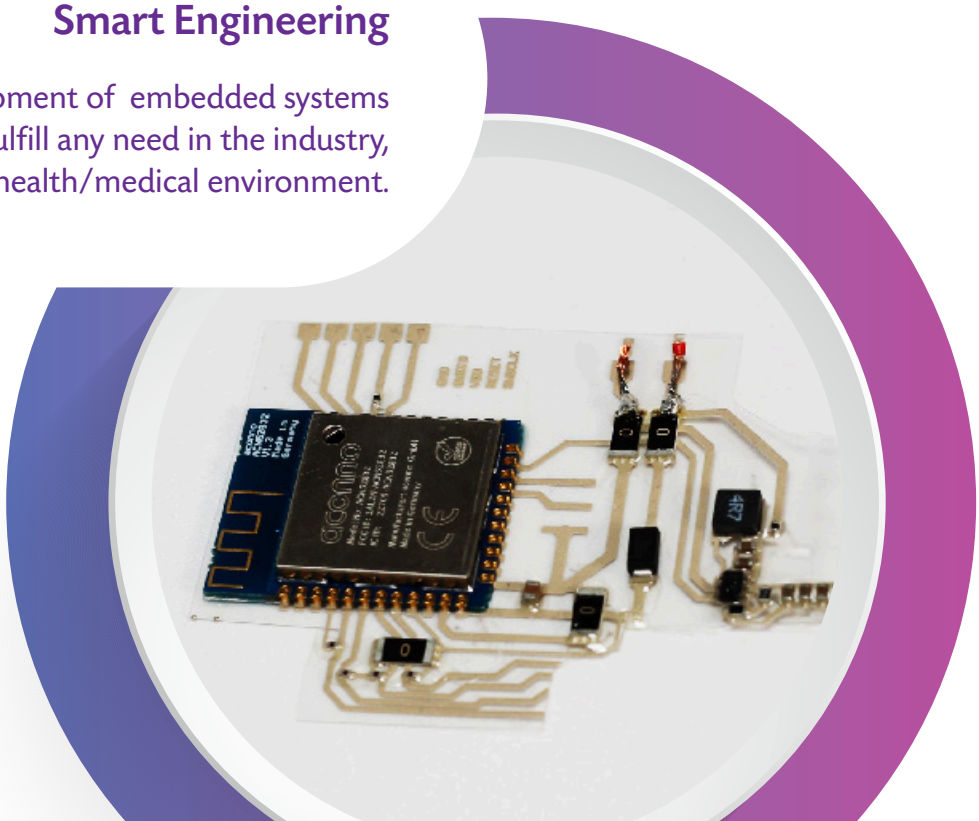
Design and development printed devices with adhoc functionalities to tackle major issues in health, environmental monitoring and energy.

In Mold Electronics

Design and manufacturing
of functional and decorative films
for plastic, composites, silicone
and elastomers devices integration.

Smart Engineering

Design and development of embedded systems
and IoT devices to fulfill any need in the industry,
smart cities or health/medical environment.



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Idea Materials Process

Printed sensors & Actuators research line

Design and development of printed devices with adhoc functionalities to tackle major issues in health, environmental monitoring and energy applications.

Advanced Manufacturing

- Functional printing
- Microfluidics rapid prototyping
- Automation & scalability

Advanced Materials

- Custom surface functionalization
- Soft materials
- Organic and hybrid materials
- Sustainability

Device Technologies

- Biosensors & Bioelectronics
- Optoelectronics
- Point of Care devices
- Green energy

Electronic Management

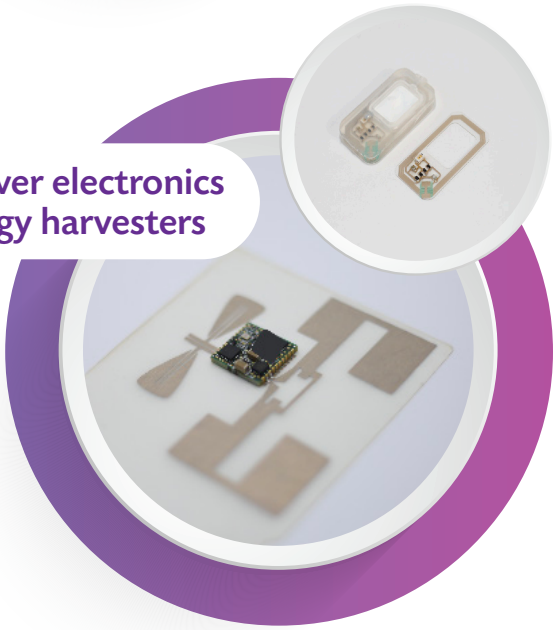
- IoT technology
- Signal processing

Circular economy Industry 4.0

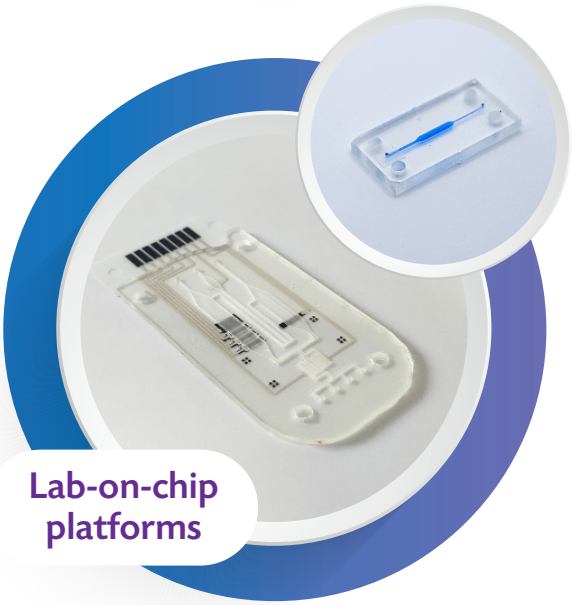
Soft electronics

Energy conversion, harvesting & storage

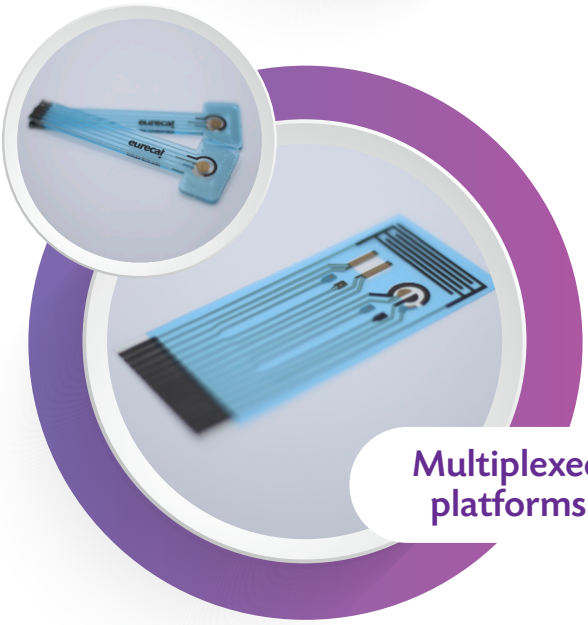
Paper-based sensor devices



Low power electronics & energy harvesters



Lab-on-chip platforms



Multiplexed platforms

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Idea Materials **Process**

In Mold Electronics research line

Design and manufacturing of functional and decorative films for plastronics, compositronics and silicotronics applications.

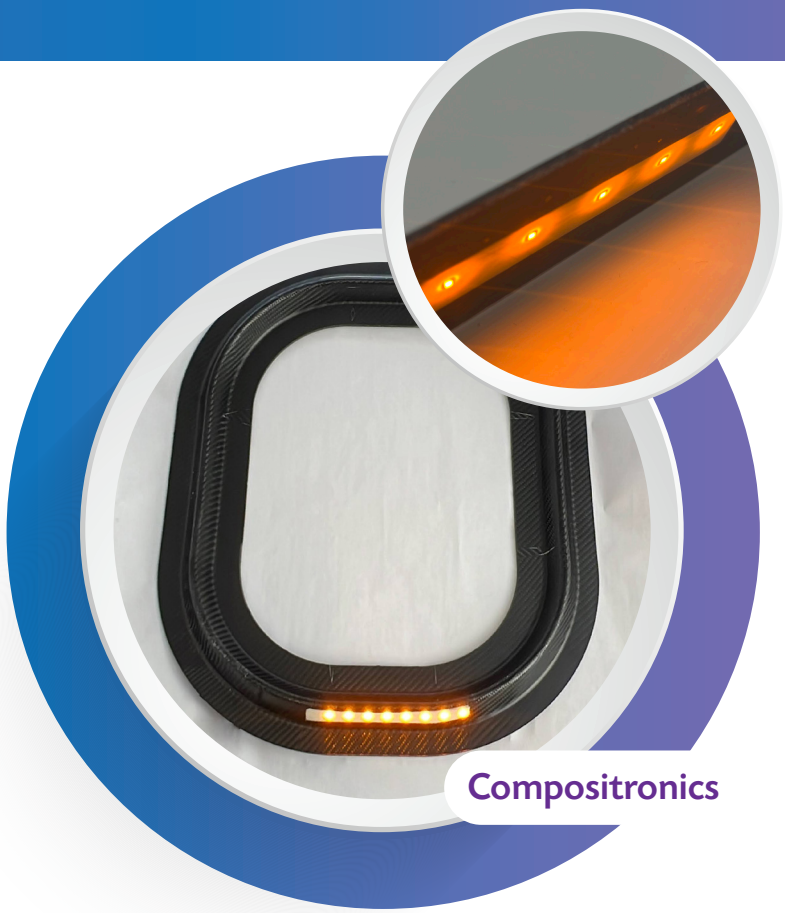
Advanced Manufacturing

- Printing technologies
- Flexible and rigid electronic design
- Sensor technologies
- Advanced lighting

Advanced Materials

- Functional inks & adhesives
- Flexible substrates & resins
- Surface mount components

Circular economy Industry 4.0



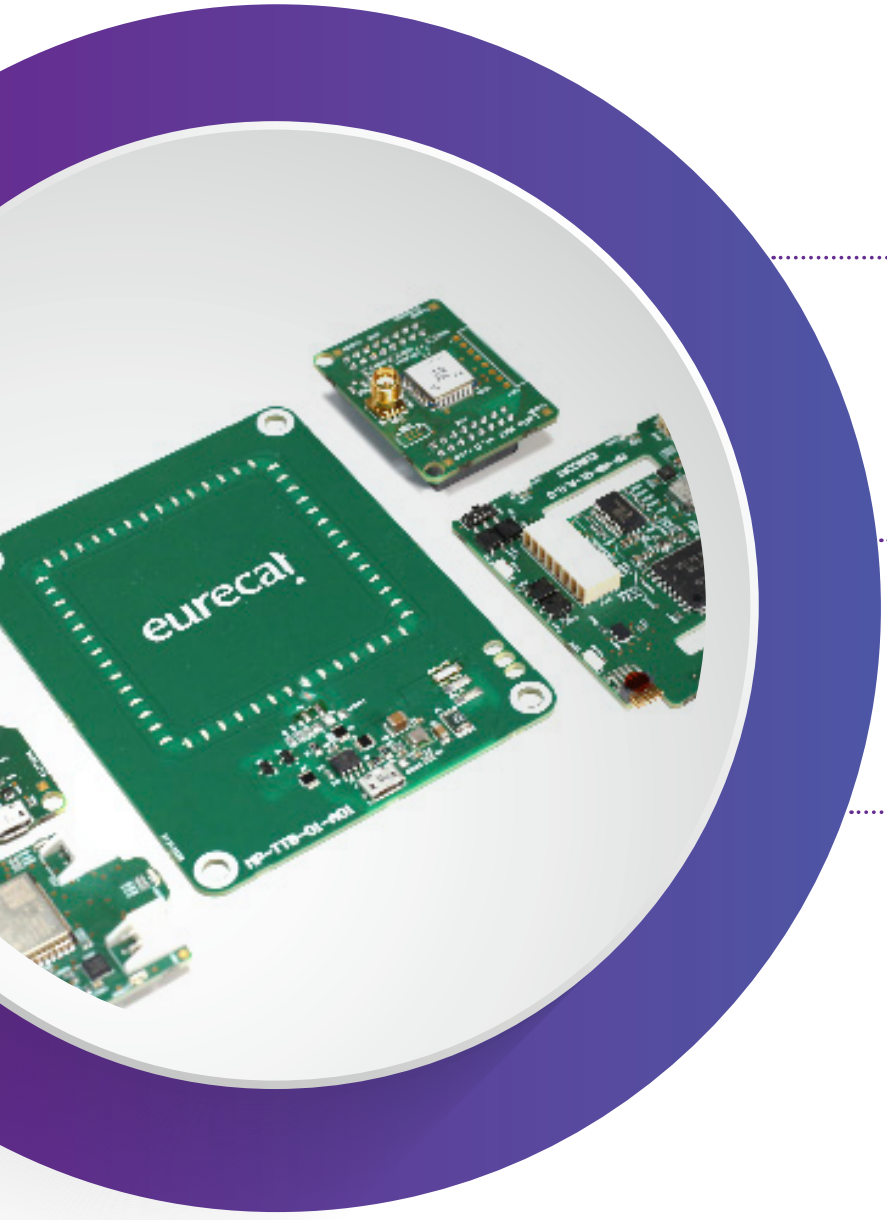
Compositronics

Silicotronics

Plastronics

Smart Engineering research line

Design and development of embedded systems and IoT devices to fulfill any need in the industry, smart cities or health/medical environment.



Embedded Systems

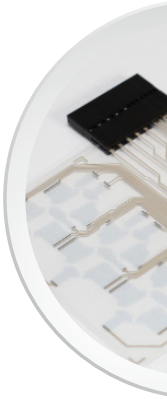
- Hardware Design
- Firmware Development
- Data acquisition
- Algorithm design

Edge AI

- Predictive maintenance
- Signals classification
- Dataset generation
- Model deployment

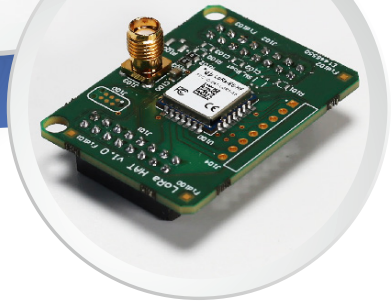
Communication

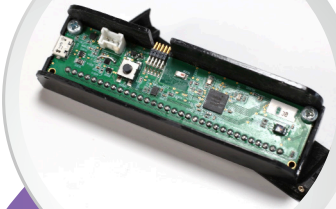
- Bluetooth, Wi-Fi, LTE
- Modbus, KNX
- LoRa



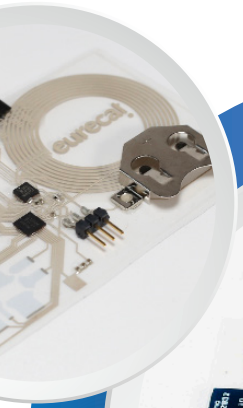
Circular economy Industry 4.0

IoT Devices Development

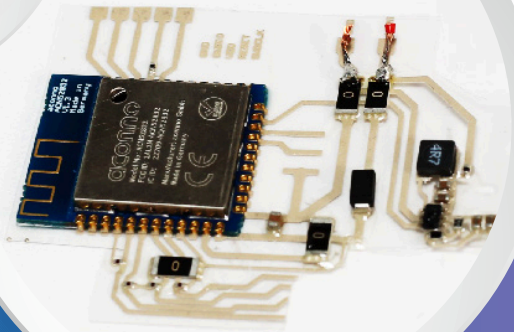




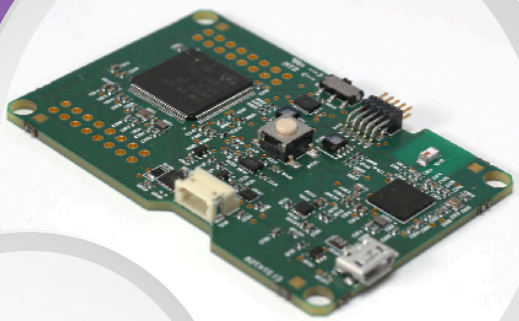
Hardware platforms

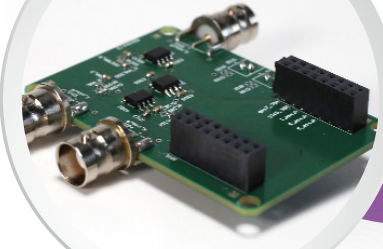


Flexible electronics



Edge AI TinyML





Success cases

Project Púlsar

Project Púlsar demonstrates the application of **Plastronics in a vehicle centre console**. With only 3 mm in thickness, this smart plastic surface presents an intuitive HMI interface with seamless LED illumination and capacitive sensors, all monolithically embedded within a single plastic part.

Window switches: up and down capacitive touch sensors for window control

Temperature slider: independent temperature control by sliding up and down

Car mode slider: switch between normal, eco and sport car modes by swiping across the slider

Temperature slider: independent temperature control by sliding up and down

ENGINE start/stop: safe long-press operation capacitive touch sensor for car start and stop

Light spears: search light, guide light and dynamic feedback lighting for all the operations

Emergency lights: capacitive touch sensor for emergency lights

Differential Technologies
Plastronics

More **complex 3D-shaped** electronics
Structural electronics formed to high factor geometries.

More **design** freedom
Get whatever you need wherever you need.

More **durable** electronics
Fully-enclosed electronics in monolithic structure.

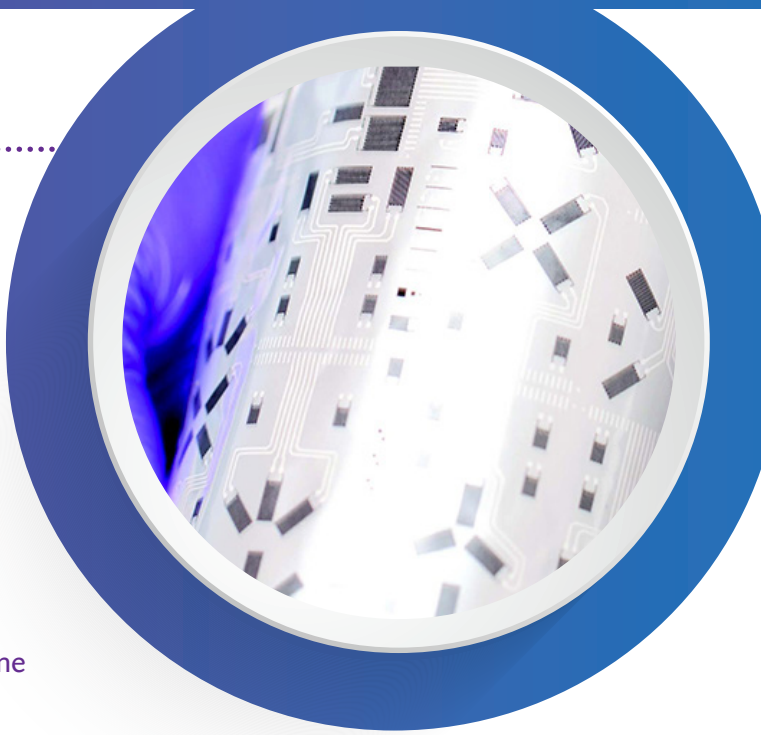
More increased **funcionality**
Advanced sensing, lighting and communication technologies for HMIs.

Less **plastic**
Plastronics smart structural parts range 2.5 – 5 mm in thickness. Less material is used keeping the same performance.

Less **emissions**
Bottom-up or additive manufacturing makes up a cleaner and environmental-aware process.

Less **components**
Easier physical and chemical recyclability of parts.

Success cases



MADRAS

Development of novel materials and manufacturing processes for a high-volume production of OLAE devices.

The **MADRAS** project, coordinated by Eurecat, has developed **new advanced and sustainable materials and manufacturing processes for a scalable production in an industrial level of OLAE devices.** The project addresses the use of conventional and established industrial manufacturing techniques and adapted processing tools to deliver this innovative technology closer to market.

The use of organic and large area-electronics (OLAE) technologies and components have experienced a remarkable increase in recent years thanks to printed electronics technologies progress which offers solutions to develop OLAE thinner, more power-efficient, flexible and lightweight devices. However, the manufacturing processes for these devices are difficult to adapt to mass production.

MADRAS has boosted a high-speed manufacturing methodology with new materials and **In-Mould Electronics (IME)** for a high-volume production of OLAE devices that are more affordable, more durable and have longer life cycle.

The innovations developed during the project has been demonstrated and implemented into **two different demonstrators** of plastic-embedded printed electronics: a geotracking flexible tag addressed to the packaging sector and a biometric photosensor for user identification in a platform of scooter sharing.

The MADRAS project, apart from Eurecat technology centre, also counts with the participation of **11 partners** from Spain, France, Denmark, The Netherlands and the Czech Republic.

European Commission | Horizon 2020 European Union Funding for Researxh & Innovation

Success cases

Giance

The **GIANCE** project, coordinated by Eurecat, aims to provide i**nnovative solutions to environmental challenges** by establishing a holistic, industry-driven platform for the **scalable, sustainable, lightweight, and recyclable design** for the development and manufacturing of the next generation of graphene and related materials (GRM), multifunctional composites, chemistry, and enhanced functionalities (e.g., wear, corrosion, chemical and fire resistance, hardness and impact resistance, high-temperature resistance, structural health monitoring, ultra-low friction surfaces).

Within **GIANCE**, advancements will also be made in manufacturing processes, improving synthesis and stability, thereby reducing environmental impact. This initiative enables strong connections with end users, and as a result, commercial proposals will be developed and qualified for high TRLs. Therefore, **GIANCE** will support **11 use cases applied to future technologies across various sectors**, including automotive, aerospace, energy, and water treatment. It also aligns with the outcomes of the Graphene Flagship initiative, establishing a credible path for accumulated knowledge to impact the EU industry.

The consortium comprises **23 partners from 10 different countries,** representing the entire value chain, including leading manufacturers, major industries, top-notch research and education organizations, and innovative SMEs.

Eurecat counts with the participation of two technological Units, the **Functional Printing and Embedded Devices (FPED) and Plastic and Composites Processes (PCP) Units**. Eurecat leads the use case for the development **of printed structural health monitoring graphene-based sensors integrated into composite materials (UC8)** and contributes to the validation of the use case involving **electrolyzes with graphene-based electrodes for hydrogen production (UC10).**

Project financed by the European Union's program Horizon 2020 under the call CL4-2022-DIGITAL-EMERGING-02-20-2D-material-based composites, coatings and foams (IA) Part B

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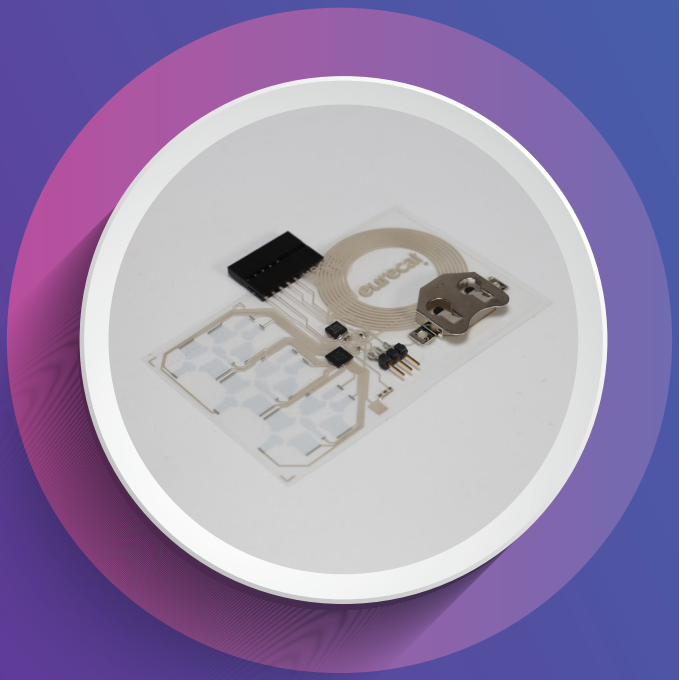
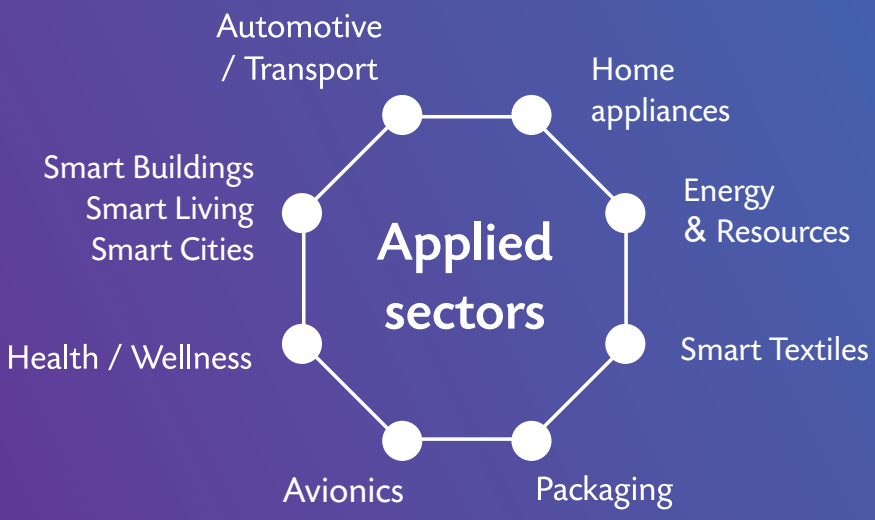
" Innovating for business "





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