



**Smarter
surfaces
that make a
difference**

cidetec >
surface engineering

Automotive smart surfaces:
From decorative to functional



Smarter surfaces that make a difference

Cidetec is a key international player in research and innovation related to surface engineering and polymeric and composite materials. We specialise in processing surfaces and materials through disruptive technologies, ultimately aiming at technological transfer that will ensure the right solution for each customer.

We focus on:

1

Developing **REACH-compliant coatings** and surfaces that provide multifunctional properties such as corrosion and wear resistance, protection against hydrogen embrittlement or fouling, electromagnetic transparency, customised aesthetics, omniphobicity and conductivity enhancement.

2

Developing **new innovative, sustainable polymeric materials** based on biomass waste, self-healing elastomers, thermoplastic formulations with custom properties, and our own 3R patented technology (Reprocessable, Repairable and Recyclable thermoset composites).



We are Spain's only technological centre specialising in Surface Engineering.

CIDETEC is one of the major European technological centres specialised in surface processing and finishing, encompassing a wide scope of technological offer.





A big player in Surface Engineering

CIDETEC is one of
the major European
technological centres
specialised in surface
processing and
finishing

180+

Customers
in 2023

H2020



26

(10 of them
coordinated)

HEU



13

(3 of them
coordinated)

11



**PATENT
FAMILIES**

STAFF

Researchers &
Technicians



90

3



**Spin-offs: INNOMAT,
KERA-COAT, TUBA-COAT**

3



**PhD theses in
progress**



Automotive



How can we help?

The mobility of the future is based on 3 main megatrends

01

Sustainability

- > Sustainable materials and surfaces
- > Reach compliance coatings
- > Weight reduction
- > Electric vehicle

02

Autonomous & Connected Vehicle

- > Advanced driving assistance
- > Increased safety features
- > Connected vehicle
- > Autonomous vehicles (shuttles, robotaxis)

03

Safety & Comfort

- > Shared vehicle
- > Safe and clean vehicle
- > Printed electronics
- > Aesthetic surfaces
- > **Smart surfaces**



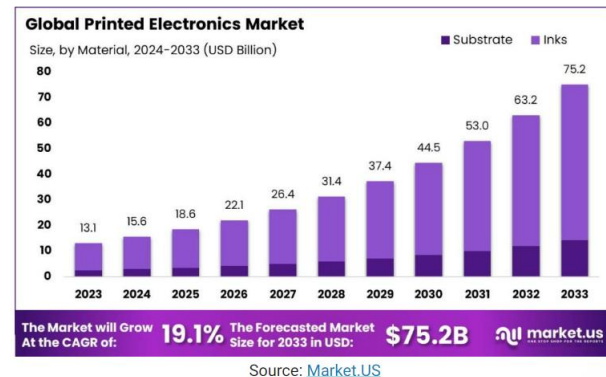
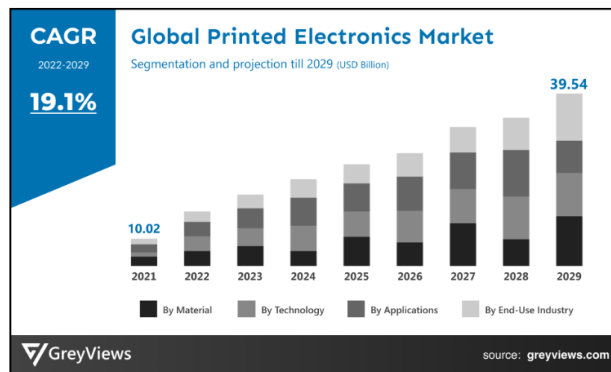
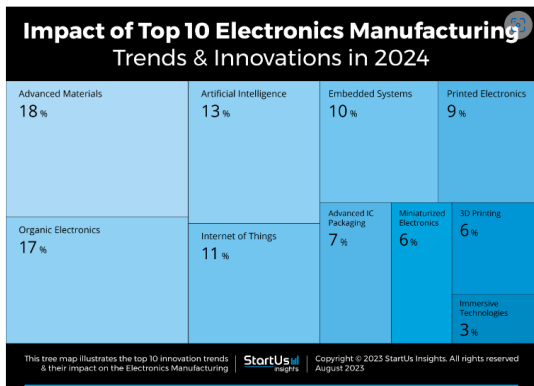
Printed Electronics Market



The printed electronics landscape has seen substantial growth in recent years and there's no sign of it slowing down. In 2023, the global printed electronics market size by material and substrate reached **13.1 billion USD**. The healthcare/wellness and automotive sectors **dominated the market**, fueled by various applications ranging from in-mold touch sensing to wearable glucose test strips.

As 2024 kicks off, the forecast for the printed electronics market is showing promising growth — supporting well established sectors like conductive inks while also shining light on emerging use cases like in-mold electronics. These trends serve as an indicator of how closely the next generation of electronics will integrate with our daily lives.

Individually, the market for printed electronics is projected to grow at a compound annual growth rate (CAGR) of approximately **19% between 2024 and 2033**. By the end of 2024, the market is projected to reach a total value of over 15 billion USD.





Printed Electronics Market Drivers

Conductive inks: Being the most critical component of printed electronics applications, continued investment in conductive inks will enable cost-effective production of lightweight and flexible electronics.

Substrates: Equally as important as conductive inks, the rise in lightweight, flexible, and stretchable applications will also result in increased demand for materials to print on.

RFID technology: As retail tracking and data communication continues to expand, RFID technology will grow in tandem, particularly with regards to opportunities in smart packaging.

The Internet of things (IoT): Forbes projected that by the end of 2024, over 200 billion IoT devices, ranging from toys to appliances, will be connected online. With the form factors of electronics rapidly evolving, it's expected that IoT devices will help drive global adoption of printed electronics.

Flexible and stretchable electronics

Displays: With applications in consumer electronics and automotive dashboards, displays hold the highest market share at over 38%.

Sensors: Innovations in healthcare, batteries, environmental monitoring, industrial automation, and wearables can be attributed to the continued growth of sensors.

Photovoltaics (PV): Within the energy sector, flexible PVs are predicted to gain large traction primarily driven by integration with buildings.

Flexible Batteries



Motivation: Market trends



Energy



Comfort Electronics



Power Electronics

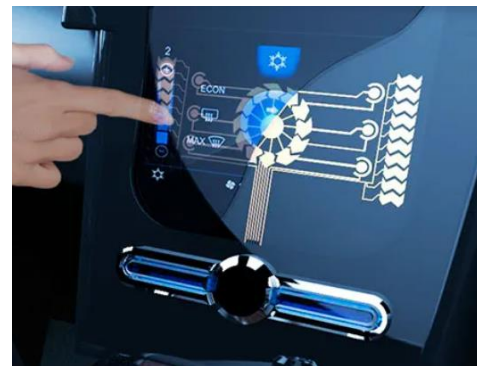
Empathy



Comfort Controls

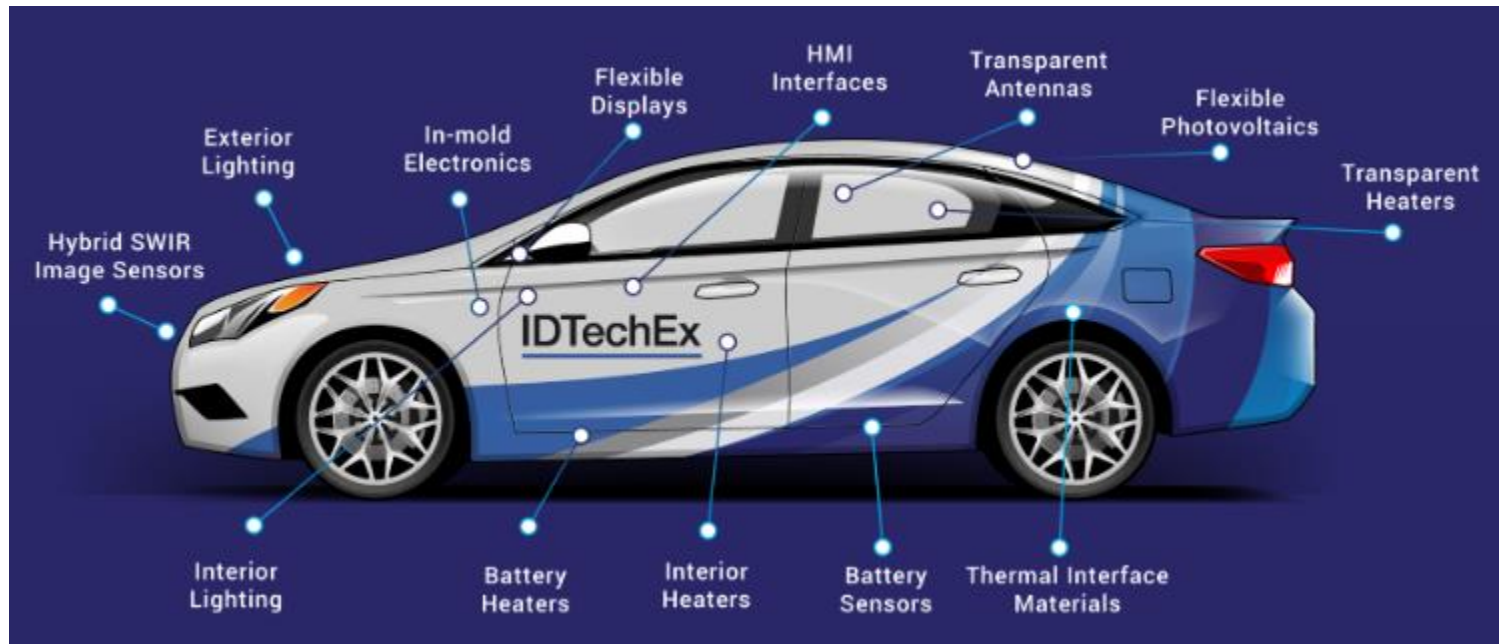


Drive Controls





Applications



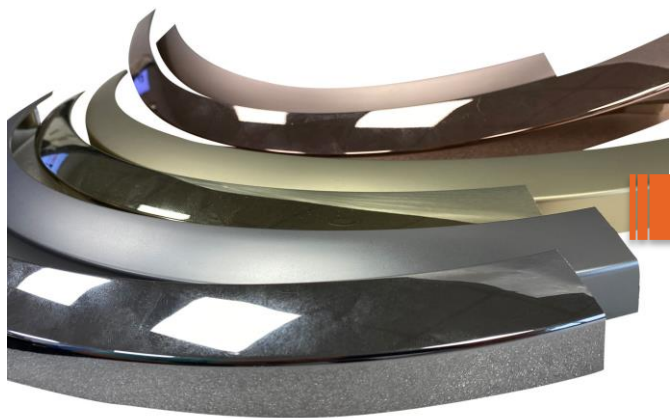
New Opportunities/Applications

Battery Monitoring and Heating for Electric Vehicles

Offering the maximum value minimal weight and cost is a primary concern for electric vehicle manufacturers. For batteries, this means always working as effectively as possible, and battery capacity is strongly determined by temperature. Arrays of flexible, printed temperature sensors that can offer battery monitoring and heating elements could be incorporated into the same film. Temperature sensors can also detect sudden increases in temperature that indicate a malfunction or safety concern.



Our Motivation



Decorative surfaces



Fuente: Covestro

Functional surfaces

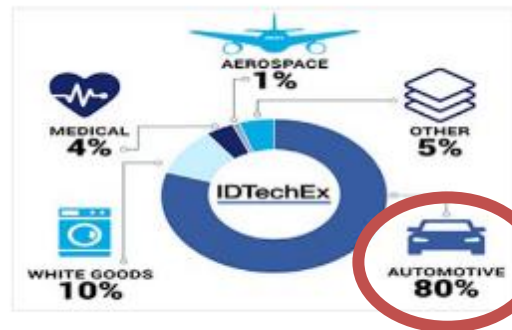


In-mold electronics



With IME, the conductive traces are printed on a flat substrate, and electronic components such as LEDs may be mounted. This is then thermoformed and infilled with injection molding to produce a smooth, decorative component with capacitive touch functionality. These components are up to 70% lighter, take up less space, use fewer parts, and are simpler to produce than the conventional mechanical switches that they often replace. Automotive interiors are the main potential application (see graphic), but the technology also shows promise for consumer appliances especially given the wipe-clean interface it produces.

In this world of touch screen models where just a human touch can allow any machine to understand the commands clearly and In-mold electronics (IME) is just another form of innovation.



There are many different 'human-machine interfaces (HMI)' options, ranging from the well-established (keyboard/mouse/mechanical switches) to somewhat more recent developments such as the capacitive touch screens found on smartphones.





Smart surfaces



Printed electronics: Pilot plant



Ink-formulation



Printing



Hybridisation



Thermoforming
TP and Composites (3R)



Injection
C-RTM

All the value chain

Thermoplastics & Composites

- > Ink formulation
- > Printing: Screen printing & Inkjet
- > Hybridisation: ESSEMTEC PUMA 1
- > Thermoforming: NIEBLING SAMK 720 (TP & Composites)
- > Injection: ARBURG ALLROUNDER 470S & C-RTM



Developments

- ✓ Modified sustainable inks with improved properties and/or performance
- ✓ Organic conductive inks (metal-free) with improved stability through the incorporation of biobased nanoadditives
- ✓ Transparent conductive inks with low metal content

Functional & sustainable products

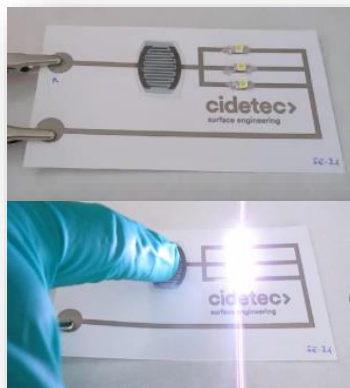
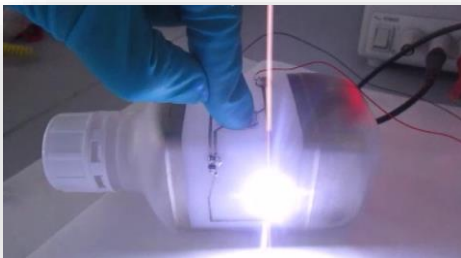




Developments

- ✓ Selective deposition of functional inks in 2D and 3D surfaces
- ✓ Deposition of metallic circuits with high conductivity in 2D and 3D surfaces
- ✓ Capacitive sensors
- ✓ Haptic sensors for user interactive (UX)

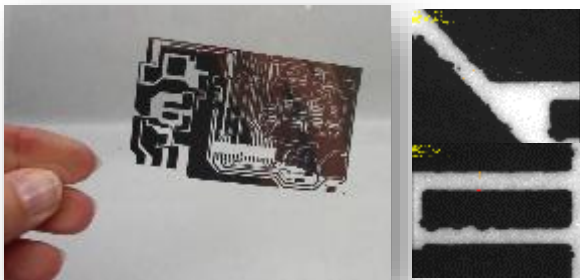
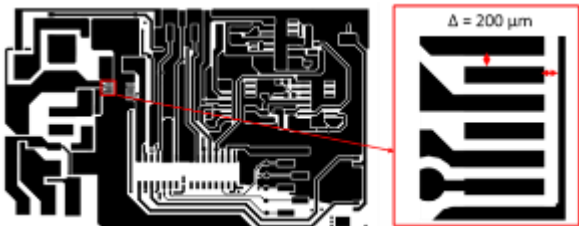
Smart control touch





Developments

- ✓ High resolution printed circuits (PCBs) on rigid or flexible 2D surfaces



1. Process simplification
2. Reduction of manufacturing times
3. Weight reduction
4. Material savings (additive process)

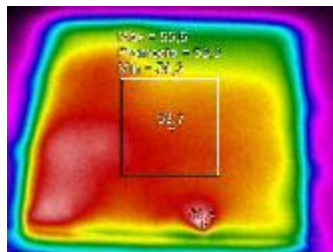
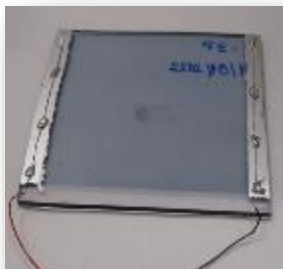
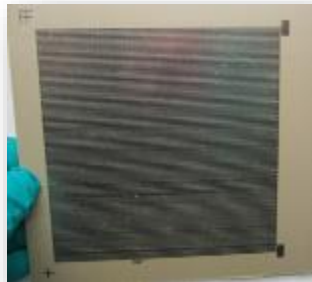
Flexible PCBs PCBs integrated into automotive parts



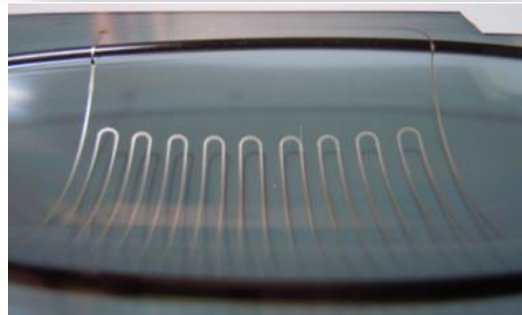


Developments

- ✓ Heaters on different materials (PET, PC, PEEK, Kapton, etc.)
- ✓ Metallic tracks with high resolution on 2D surfaces
- ✓ Transparent conductive heaters on 2D and 3D surfaces



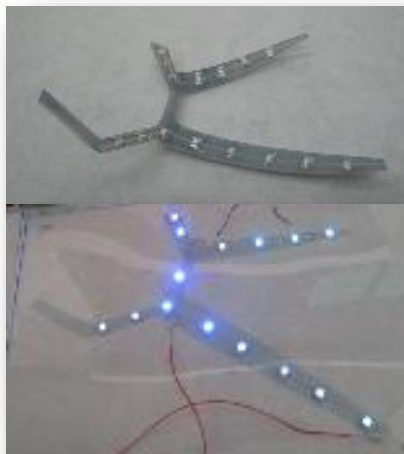
Heaters (radar and optical transparent)





Developments

- ✓ Deposition of Transparent conductive ink for light integration



Integration: Invisible Electronic





Automotive smart surfaces: From decorative to functional

- ✓ Relevant role of **OEMs** as value chain prescriptors and during validation.
- ✓ **Printed Electronics is a versatile technology** allowing the integration of **advanced** materials for **new functionalities**.
- ✓ **Sustainability is a MUST**: new substrates, cutting-edge inks, processes, etc.
- ✓ **Digital Tools** should help technical challenges like: scrap reduction by design, use of more ecofriendly materials, defective reduction, repeatability and reliability
- ✓ **Be creative regarding new applications** (exterior, batteries, grilles, displays, etc.) **and sectors**.



9-11 ABRIL 2024
FIRA BARCELONA - GRAN VÍA



Egoitz Luis

BUSINESS DEVELOPMENT
MANAGER - AUTOMOTIVE

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Thank
you

cidetec 
surface engineering