



GENESINK

ENABLING DISRUPTIVE CONSUMER ELECTRONICS

Nano-ink Solutions for the future Consumer Electronics



Let's print the future !

About Our Markets

A new market growth driven by the on-going development of applications

Over the past year, printed electronics has been driving growth in various industries such as consumer electronics, automotive, healthcare/ well-being, smart building, packaging and connected objects (IoT). It has created several multi-billion-dollar industries within the past few years (OLED displays, e-readers and conductive ink for many diverse applications).

The benefits of these new electronics are numerous: lower cost (reduction of total cost of ownership), improved performance, flexibility, transparency, stretchability, reliability, lower environmental impact by reduction of raw material processed.

- **Consumer Electronics**

Whether it is smartphones, wearables, televisions or home appliances: In consumer electronics, printed electronics are increasingly changing the appearance and functionalities of solutions and products. Printed electronics and the fine line printing capabilities of our Smart Inks has paved way for electronic designer to solve the biggest problem they face form factor reduction and sleekness.

- **EMI shielding**

Advancement in electromagnetic interference (EMI) shielding technology is a critical factor as end products and components move toward miniaturization with higher density designs and increased function at higher speed. Smart Inks from GenesInk is capable to achieve required shielding effectiveness significantly above current industry requirements with very low film thicknesses. This combination allows the continuous miniaturization of handheld devices, required by the end customers.

- **Integrated Smart Systems/ wearables**

Printed electronic technologies for sensing, interconnectivity, antennas, and energy harvesting / storage, with the computing power of small silicon chips, is beginning to have a major impact on integrated smart systems. Wearable health and well-being applications, including cardiovascular or medication compliance monitoring devices and enhanced bandages,

are also taking advantage of the flexible form factor of printed electronics.

- **Connected Objects and IoT**

Majority of applications that incorporate printed electronics are getting thinner in dimension and form factor is a key parameter. SmartInk conductive inks solutions open a new dimension for highly flexible electronic devices and connected objects by releasing technical roadblock.

- **HMI (Human Machine Interface)**

Durability, ease of use, aesthetics and design have all been touted as benefits of capacitive touch controls in car interiors. Capacitive human machine interfaces (HMIs) enable buttons, sliders and touchpads to be located on different materials and in different shapes, resulting in smart surfaces on dashboards and consoles. Touchscreens and capacitive buttons also give current car models a contemporary look and feel that match today's digital world, and they bring smart technology to drivers' fingertips. Furthermore, capacitive interfaces are solid-state electronics with no mechanical parts, enabling them to endure harsh automotive environments and heavy use.

- **OLED and OPV**

The largest share of the market is currently OLED displays. Young, niche markets include organic photovoltaics (OPVs) and OLED lighting.

- **Transparent conductive Inks for displays, touch panels**

Transparent conductive films find applications in various fields in a wide range of smart glasses, OPV, OLEDs, displays. With the emergency of new technologies such as flexible OPV or flexible displays, ITO films are no longer relevant since this material is brittle. GenesInk TranDuctive® is a wet solution printable with standard coating and screen-printing processes. It is compatible with plastic substrates thanks to its low drying temperature, enabling flexible device manufacturing.

Towards lightweight, flexible and connected electronics

GenesInk is a world leader in advanced materials and formulations for the Consumer Electronics market.

Our solutions of conductive and semi-conductive inks bring competitive advantages to industries looking for thin and flexible devices, high conductivity and outstanding electrical performances.

► **Product development strategy:**

Since GenesInk creation we have been strongly networking and cooperating with the industry and all related R&D centers and universities. This has enabled us to exchange product needs and test data with more than one thousand companies and R&D centers. Based on that global network with direct users and OEMs we are able to collect strategic, marketing and technical information that are one of the pillar of our innovation: listening to our customers. Each new development is protected by IP's and patents to protect our knowledge on synthesis of nano particles and formulations of inks. We also have secondary patents to protect the application and soon we would like to patent the deposition method as well.

Multiple approaches are used to develop and market new products:

- Understanding new products developments needs: our world class scientific committee is guiding the technological roadmap.
- Listening to customers technical needs and specifications: Customer intimacy enables GenesInk to fine tune existing formulas to the exact needs of the process (beta customers testing).
- Cooperating with R&D centers and key industry players: Acting as formulators in the

development of new electronic products enable GenesInk to understand future needs and constraints.

• **Application/ process customized product lines:**

Our patented technologies are successfully used in applications such as:

- EMI Shielding
- Integrated Smart Systems / wearables
- Human Machine Interface (HMI)
- Thin and Large Area Electronics: OPV OLED
- Transparent conductive films for displays and touch panels

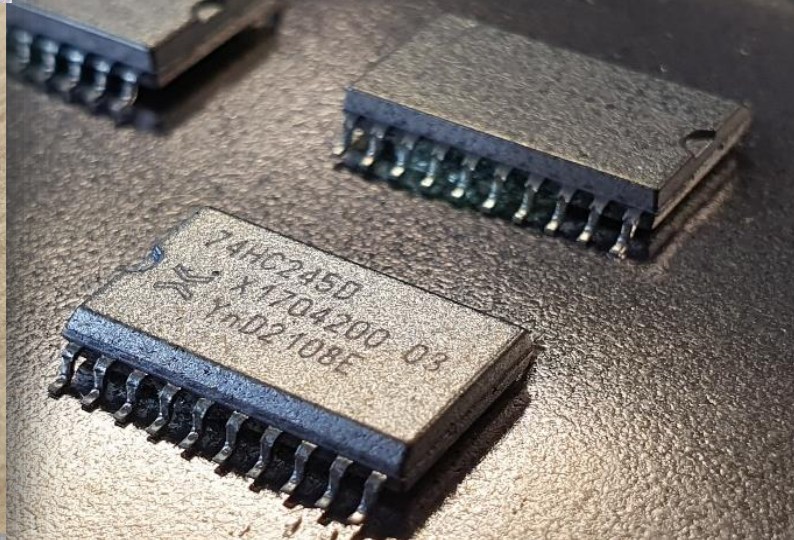
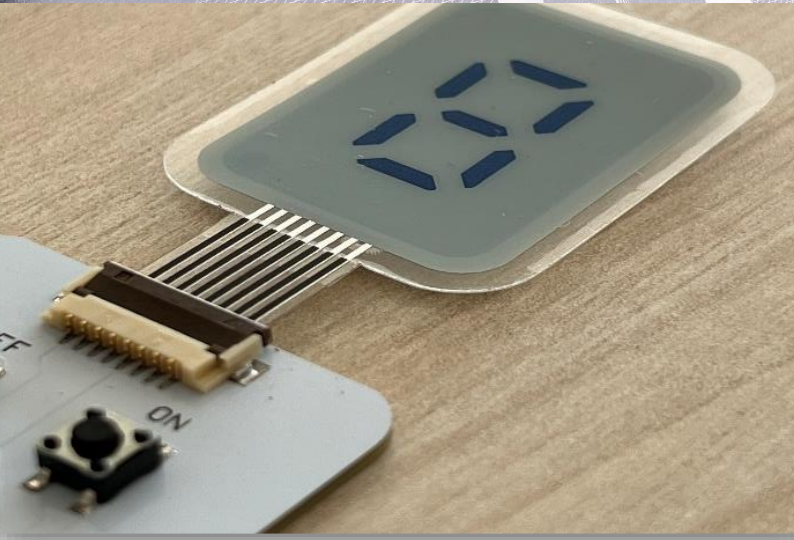
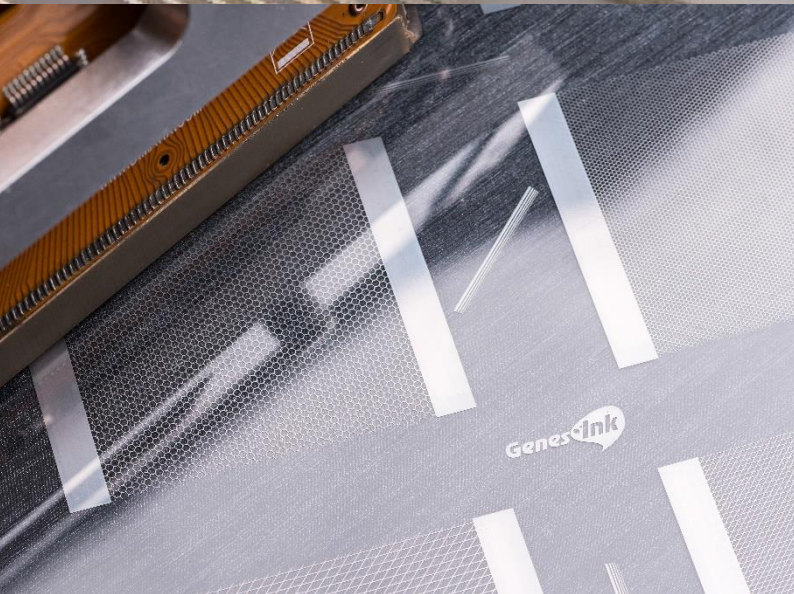
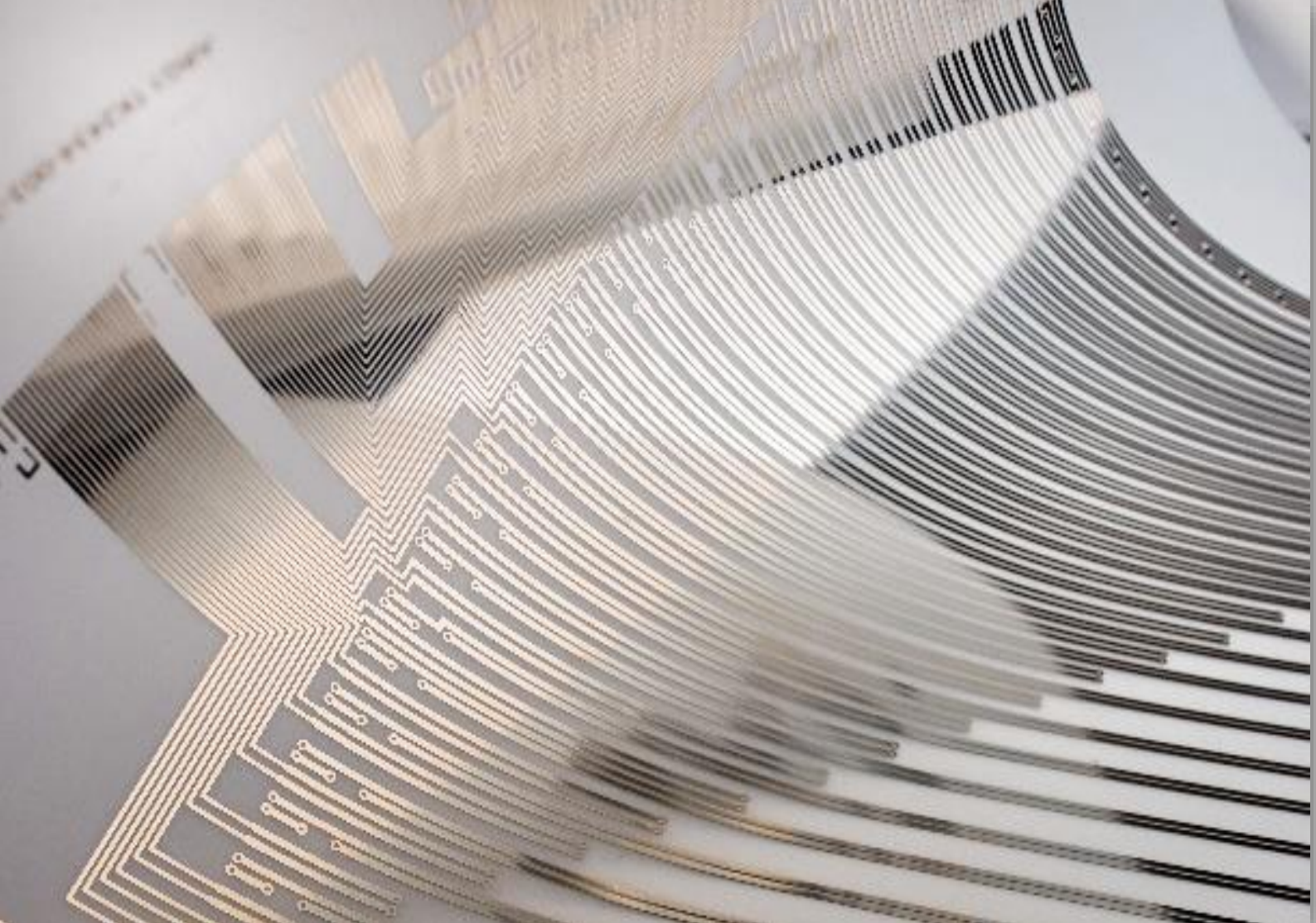
Our inks are compatible with industrial printing methods and flexible substrates for large scale production.

GenesInk is a company based in the south of France, in the area of Aix-En-Provence. It has a global distribution network and a sales office in Taiwan, Japan and USA.

As an active company in the field of innovation, GenesInk is part of the Horizon European research program. Ongoing projects focus on ITO-free electrodes manufacturing and In-vitro & In-vivo sensors,

► **How do we support our customers:**

The mission of GenesInk Technical Support team is to provide the most suitable solution for each customer application. We support customer through each step of its process, from the proof of concept all the way to production, passing by raw material validation and prototyping. We perform in-house printing tests & formula customization in order to stick as closely as possible to customer environment.



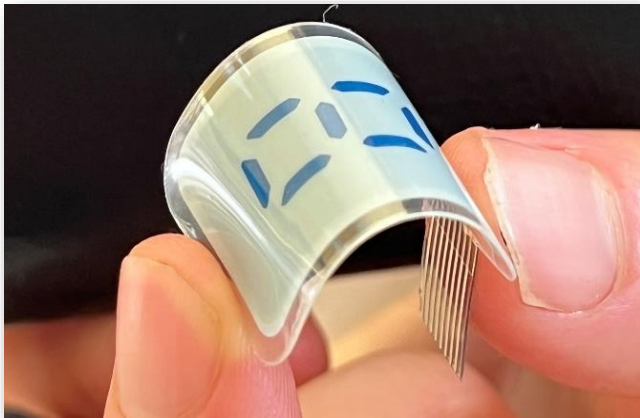
Products Overview

Make GenesInk your advanced material supplier for printed and flexible electronics

Our inks offer outstanding performances and open new opportunities for flexible and innovative electronic devices.

Our company is certified ISO 9001 which guarantees our customers consistent high quality

- **High Quality Products delivered quickly at Industrial Scale**
- **Safe and Ecofriendly Solutions for Greener Electronics**
- **Cost Benefits for our Customers**
- **Easy and friendly to use**
- **5x more conductive**
- **10x lesser material used per unit**
- **Permitting better flexible & stretchable properties**



Our Range of Products:

GenesInk offers advanced materials for the printed & flexible market:



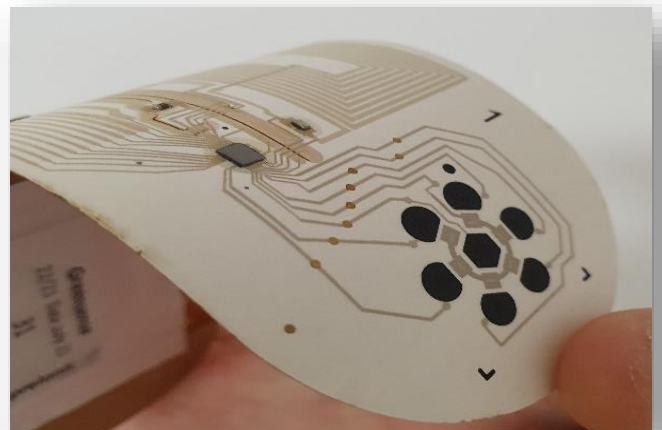
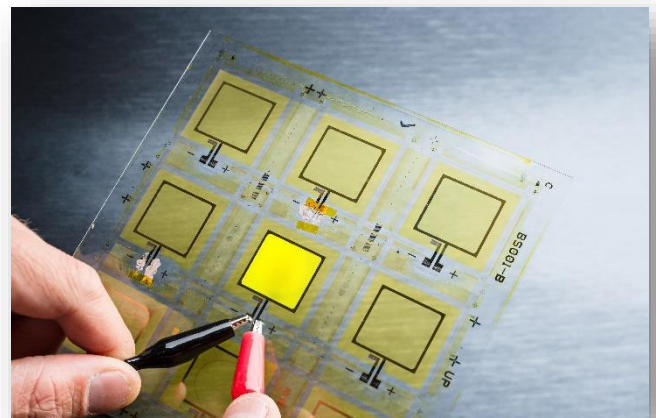
- **Nano-silver inks:** Smart Inks is range of highly conductive and low temperature inks for consumer electronics, IoT, EMI shields and IME applications.



- **Transparent Conductive Inks:** TranDuctive® is our product line based on AgNW aimed at transparent electrodes, ITO replacement and OLED OPV.



- **ZnO, AZO and WO3 Nano Inks:** solutions for efficient and longer shelf-life organic solar cells or for brighter and flexible OLED lighting.



Advanced Materials for EMI shields, Consumer Electronics, Smart Integrated Systems, wearables and IoT



SmartInk, joining the IoT revolution with innovative and flexible electronic applications

Product name	Printing Method	Curing Temperature range (°C)	Specific resistivity* (μΩ.cm)	Resolution (μm)	Applications
Smart Screen F	Screen printing	60 ~ 250	2.5	80 ~ 100	RFID, flexible PCB, interconnects, flexible heaters, display bezel, die attached
Smart Screen R	Rotary Screen printing	100 ~ 250	2.5	40 ~ 80	RFID, flexible PCB, interconnects, flexible heaters, display bezel, die attached
Smart Screen M	Screen Printing	100 ~ 250	30	80 - 100 μm	In Molding Electronics
Smart Screen S	Screen Printing	100 ~ 250	20	80 - 100 μm	Stretchable electronics
Smart Screen P	Screen Printing	60 ~ 250	3	80 - 100 μm	OPV, PEDOT PSS
Smart Screen I	Screen Printing	100 ~ 250	2,5	80 - 100 μm	ITO
Smart Jet I	Inkjet (Industrial)	120 ~ 250	2,5	40	Touch screen, bezel, flexible PCB
Smart Jet L	Inkjet (lab)	120 ~ 250	2.5	40	Lab R&D
Smart Flexo	Flexo	100 ~ 250	3	30	RFID, security foil, OLED/OPV (electrode, grid)
Smart Gravure	Rotogravure nanolmprint	60 ~ 250	2.5	30	RFID, flexible PCB, security foil, OLED/OPV (electrode, grid)
Smart Aero	Aerosol jet	60 ~ 250	3	100	Antenna, flexible PCB
Smart Spray	Spray	120 ~ 250	2.5	NA	EMI shielding
Smart Syringe	Syringe	100 ~ 250	3	NA	ITO

*Obtained for the best curing conditions

Key advantages and benefits:

- Miniaturization possible due to fine line printing capabilities (line resolution down to 30μm)
- Unmatched conductivity (1.6x silver bulk resistivity)
- Lower the cost of raw materials (€/m² reduced by a factor of 2 or more)
- Compatible with various curing processes (NIR, Photonic, industrial oven, conveyor oven)
- Low temperature & low roughness electronic inks
- Printable on multiple flexible plastic substrates (PET, PEN, Kapton, etc...)
- Ready to use inks with short processing times ‘

Advanced Materials for Displays, Touch Panels, Flexible Organic Solar Cells and Flexible OLED



TranDuctive® for transparent electrodes, conductive films for displays, touch panels, OPV and OLED, includes ETL if needed.

Product Name	Material	Printing Method	Sheet resistance (Ohm square)	Transparency (incl.PET Film)	Roughness (nm)	Resistance (Ohm square)	Applications
TranDuctive® Screen	SNW	Screen-printing	10 to 100 (tunable to 300)	> 85%	<10	<1	Direct patterning TCF
TranDuctive N	SNW	Spray, Bar coating, Slot Die	15 to 70 (tunable to 300)	> 90%	<10	<1	TCF / ITO replacement
TranDuctive E	SNW ZnO	Spray, Bar coating, Slot Die	10 to 50 (tunable to 300)	> 87%	<10	<1	ETL layer for OPV/OLED

Key advantages and benefits:

- Low roughness and good planar properties enable easier further coating processing,
- All in one solution (no need for additional ETL).
- Tunable conductivity & high transmission
- R2R coating enables high throughputs.
- Solution coating for lower CapEx compared to ITO.



HeliosInk for efficient and longer shelf-life organic solar cells, flexible OLED lighting and displays.

Product Name	Material	Printing Method	Transmission (%)	Conductivity (S/cm)		Work Function (eV)	Roughness (nm)	Applications
				No illumination	Illumination			
Helios ETL Spray Helios ETL Jet Helios ETL Slot Die	ZnO	Spray Inkjet Slot Die	> 90	$10^{-8} - 10^{-7}$	$10^{-4} - 10^{-3}$	4.0	<5	ETL layer for OPV/OLED TCF combined with Smart Ink
Helios ETL D Spray Helios ETL D Jet Helios ETL D Slot Die	AZO	Spray Inkjet Slot Die	> 90		$10^{-4} - 10^{-3}$	3.6	<5	ETL for OPV/OLED TCF combined with Smart Ink
Helios HTL I Slot Die Helios HTL S Slot Die	WO3	Slot die	NA		10^{-2}	≈ 5.0	< 10	HTL

Key advantages and benefits:

- Compatible with flexible plastic substrates
- Low temperature curing inks
- Protection against oxidation and aging due to UV exposure
- Reduced surface roughness



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