EIT RawMaterials
Connecting matters

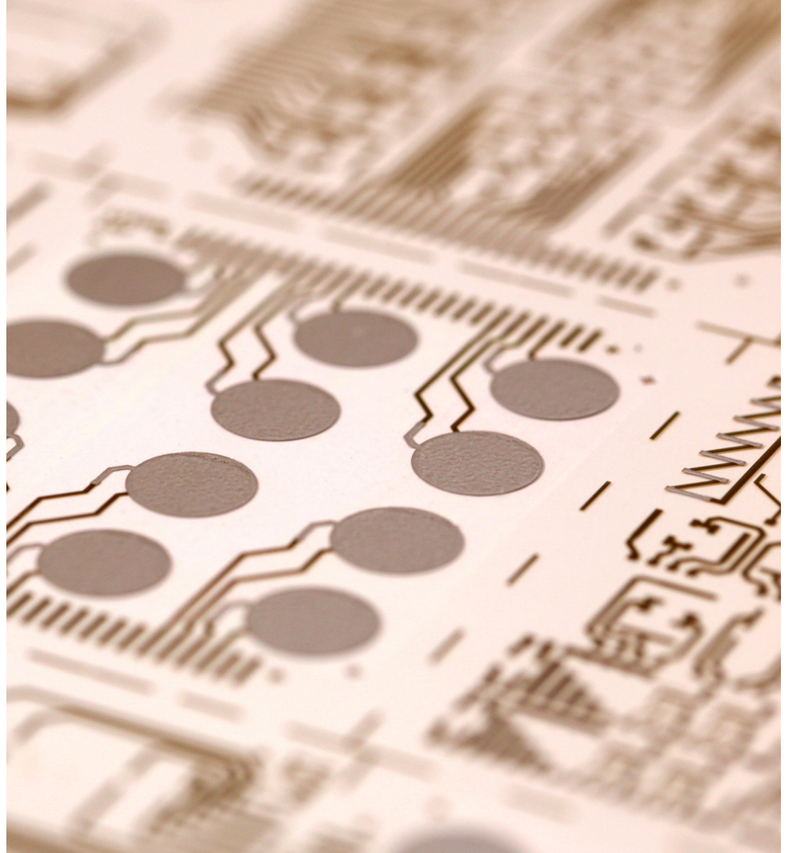
EIT RawMaterials, initiated and funded by the EIT (European Institute of Innovation and Technology), a body of the European Union, is the largest consortium in the raw materials sector worldwide. Its vision is to develop raw materials into a major strength for Europe. Its mission is to enable sustainable competitiveness of the European minerals, metals and materials sector along the value chain by driving innovation, education and entrepreneurship.

EIT RawMaterials aims to significantly enhance innovation in the raw materials sector by sharing knowledge, facilitating matchmaking activities, developing innovative technologies and supporting business creation.

EIT RawMaterials will generate a significant impact on European competitiveness and employment by driving and fostering innovation and empowering students, entrepreneurs and education partners driving towards the circular economy. This will result in the introduction of innovative and sustainable products, processes and services, as well as talented people that will deliver increased economic, environmental and social sustainability to the European society.

SUPERSMART

www.supersmart-project.eu



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R2R printing of electro-chromic displays, diodes and antennas, Hybrid electronics (i.e. typing error in displays + addition of antennas)

SUPERSMART

SCALE-UP OF PRINTED ELECTRONICS RECYCLABLE SMART MATERIALS

This activity has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under the Horizon 2020, the EU Framework Programme for Research and Innovation

SUPERSMART

Digitalization | Internet of things | Industrie 4.0 demand for ubiquitous sensing and communication elements. Printed electronic components allow one to reduce the cost per function and to process components in High-Throughput production schemes. The goal of SUPERSMART project is the industrialization of high-performance key materials in order to secure the electronic material supply chain. Taking environmental impact into consideration materials selected to be industrialized exchange toxic and rare inorganic material by organic materials and use paper substrates instead of plastics.

SUPERSMART focuses on industrialization of materials and their processing.

- **Paper-based** electronics paves the way to intelligent newspapers, smart labels and further paper-based products. But, more over, paper substrates can be produced with low use of oil-based raw materials compared to polymer substrates and are more easy to recycle lowering the CO_2 footprint. Only high-quality paper with low surface roughness is suited as electronic substrate.

- **Pressure sensor** arrays based on piezopolymers avoid the use of lead-containing conventional piezoceramics. Additionally, the capability to print piezopolymers enables one to create an arbitrarily sensor design from large area sensors to minimized sensor cell arrays. Low temperature treatment opens the way to use flexible substrates (polymer or paper based) substrates. Pyroelectric effects (cross-sensitivity against thermal changes) can be completely suppressed.

- Electronics based on **metal-oxides** is often used in large area electronics such as display backplanes. Transparency and high charge carrier mobility can be achieved by this kind of material. Since metal-oxides as wet chemical can be produced for additive printing processes, the use of harmful etching solutions can be bypassed, and the amount of used materials is minimized. No energy-intensive vacuum processes have to be used. In SUPERSMART, metal oxides based on zinc-tin-oxides are up-scaled preventing the use of scarce materials such as indium and gallium.

- **Near field communication devices** can be integrated in smart labels or smart cards. Adapting the process for polymeric or paper based substrates results in cost-effective high-through-put production schemes and paves the way to ambient electronics.

The Mission of **SUPERSMART** is to establish a supply chain for paper and polymer based electronics by up-scaling material synthesis and processing. Yield and reduction of batch-to-batch variations are the key to set-up cost-effective electronic devices with reduced impact on environment. In consequence, SUPERSMART combines smart devices with smart production schemes.

FROM NICHE MATERIALS TO COMMERCIAL PRODUCTS

Within Supersmart, industrial partners boost their production capacities in order to offer sophisticated materials, process equipment and functional systems for commercial applications:

- Piezoelectric Co-Polymers (Arkema-Piezotech)
- Electronic paper and paper printed circuit boards (PCB) (ArjoWiggins)
- Roll-to-Roll equipment (Coatema)
- Functional tags (Luquet-Duranton)

SERVICES AND COMPETENCES FOR UP-SCALING OF FUNCTIONAL MATERIALS AND SYSTEMS

- Large scale production of High quality ferroelectric copolymers and inks for organic and printed electronics and manufacturing of electronic paper. (Arkema | ArjoWiggins)
- Exchange of toxic solvents and increase of pot life for Metal-Oxides (Fh-ISC | FCT-Uninova)
- Synthesis of (piezoelectric) composites by improved deagglomeration and prevention of sedimentation, i.e. PVDF-TrFE-Piezoceramic composites (Fh-ISC)
- Poling strategies and poling automatization for piezoelectric materials (JR)
- Consulting for R2R processing (Coatema | VTT | Fh-ISC) and S2S processing (CEA)
- Printed Sensors, EC-Displays and diodes, Approach for hybrid systems (CEA | VTT | Fh-ISC | Coatema)
- Consideration about recycling and end-of-life of functional materials (ArjoWiggins)

RESEARCH AND DEVELOPMENT

- Electrochromic inks with improved properties (Uni Bordeaux)
- Functional systems using up-scaled materials and competitive process schemes (ArjoWiggins | Luquet Duranton | CEA)
- Barrier coatings on paper (Fh-IVV | Fh-ISC)