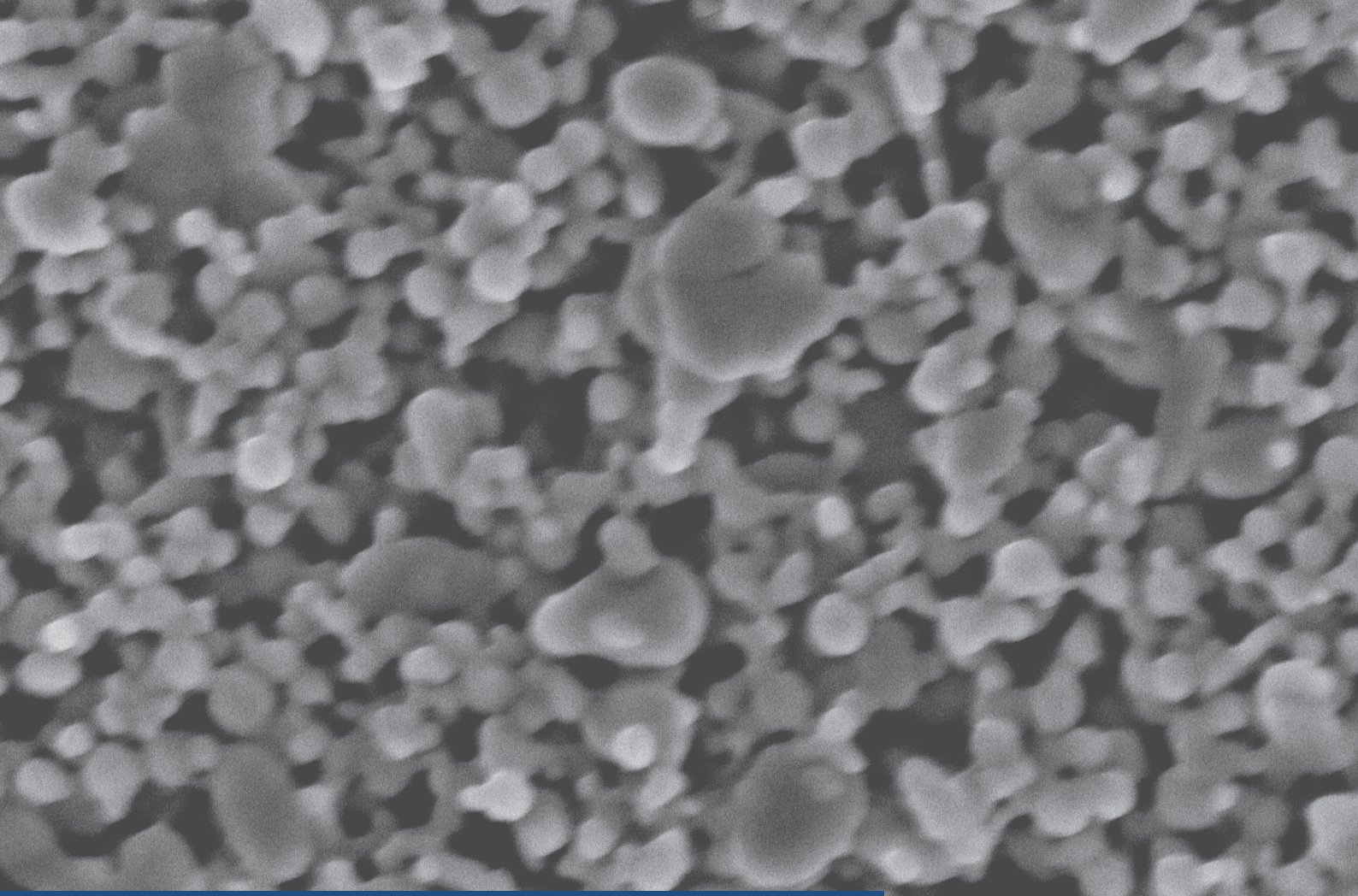


COPPER NANOPARTICLE INKS FOR PRINTED ELECTRONICS

Project Vision

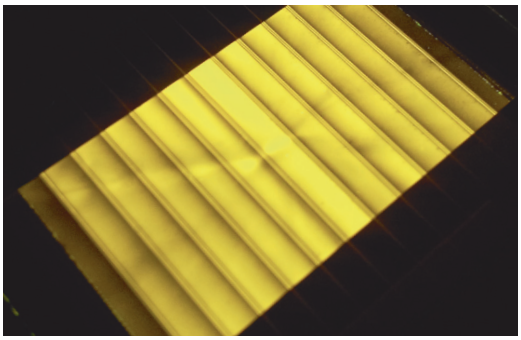
Conductive structures produced using low cost, high throughput printing technologies enabling rapid production of printed electronic components, on a wide variety of substrates.

- PLASMAS focuses on technological research combining multiple KETs (Key Enabling Technologies): nanotechnology, photonics, advanced materials with smart production processes
- Addresses demonstration activities focusing on preparing for product development
- Focuses on advanced additive manufacturing

PLASMAS

PROJECT TARGETS – INNOVATION

Printed electronics is set to revolutionize the electronics industry over the next decade and can offer Europe the opportunity to regain some of the lost manufacturing to other markets.Printed electronics uses additive printing/deposition technologies that will significantly reduce the environmental impact, lower material and energy usage and reduce the sensitivity to labor costs through the use of highly automated processes. The PLASMAS project addresses the most fundamental components of electronics manufacture: conductive structures. Within PLASMAS highly conductive Cu based nanoparticle inks are developed for screen and inkjet printing. Demonstrators are constructed from different fields:

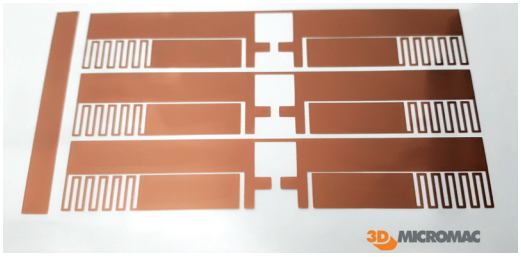


Inkjet-printed Cu grids as replacement of transparent electrodes demonstrated for OLED and OPV

- Inkjet printing of fine line structures down to 30 µm width
- Printing of Cu grid with different aspect ratios resulting in conductive transparent structures to replace ITO
- With Cu as base material potential of low cost, easy to process electrode materials

Electrochromic display integrated in Smart Card demonstrator

- Screen printing of Cu conductive lines
- Chip connection on printed Cu tracks
- Implementation of EC display into Smart Card

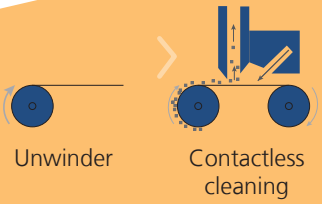


R2R inkjet-printed RFID antennas

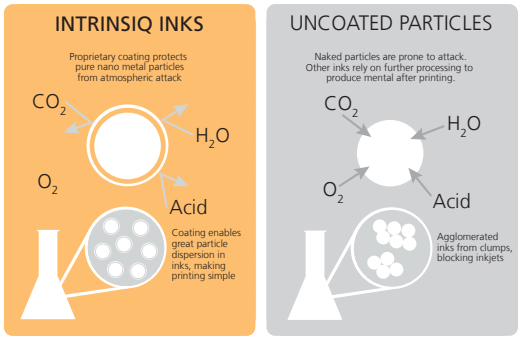
- R2R inkjet printing and laser curing of Cu inks
- Deposition on low cost flexible substrate

PCB demonstrator

- Sensor for use in the automotive industry
- Screen printing of Cu conductive lines

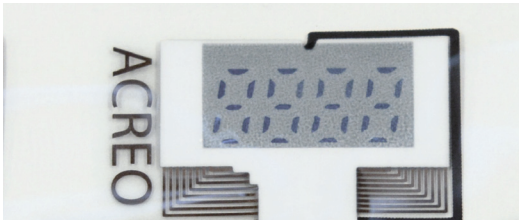


TECHNOLOGY

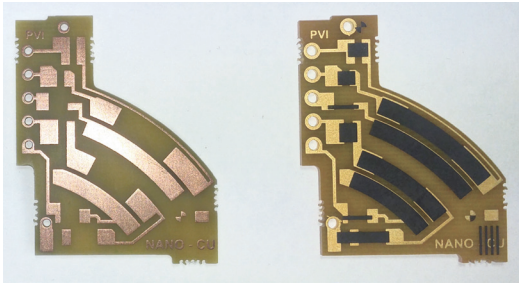


Production of these conductive structures using low cost, high throughput printing technologies enables rapid production of electronic components, on a wide variety of substrates. Copper nanoparticle production is achieved using plasma technology and supplied as pastes or inks for use in screen and inkjet printing. Curing of the copper yields in 5 to 10 times bulk resistivity and can be either performed by laser processing or using reducing atmosphere at elevated temperatures.

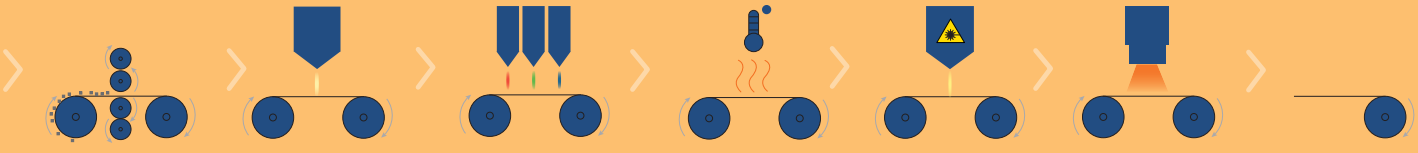
Processing of the inks is performed by inkjet and screen printing. Line widths down to 30 µm at heights between 200 nm and 1 µm have been achieved by inkjet printing and processed as grid structures to replace ITO as transparent electrode. Processing of OLEDs and OPVs on such grid structures could be performed by overcoating the grid or after embedding it in an inert resin.



By screen printing structures with line width down to 50 µm at heights of several microns, chip connection on flexible substrates for smart card applications is enabled. The integration of an EC display into the smart card allows the introduction of new features for such applications.



For PCB and RFID applications the cost factor is very crucial for the commercialization of any product. Therefore material and processing costs need to be competitive with alternate processing techniques. Inkjet printing and laser curing on R2R facilities offer a competitive technology for the processing of RFID labels on various substrates such as PET or paper.



METAL NANOPARTICLES FOR PRINTED ELECTRONICS

Project Details

Project Acronym	PLASMAS Printed Logic for Applications of Screen Matrix Activation Systems
Duration	3.5 years (11.01.2012–04.30.2017)
Project Cost	4.8 Mio € of which 3.64 Mio € are funded as Collaborative Project within the Seventh Framework Programme
Seventh Framework Programme	The PLASMAS project (Grant number 604568) is supported by the European commission through the Seventh Framework from Research to Innovation: steps towards the industrial use of European intellectual assets, stimulating the use of newly developed materials and materials technologies by industry.

Project members

The consortium combines knowledge and experience from industry and research institutions. The program supports SMEs in particular to strengthen their position in the European market. The partners in the consortium ensure that there is expertise from all aspects of the supply chain, including nanomaterials manufacture and equipment, ink formulation, pilot sale inkjet printing and curing, device characterization and construction.

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