Amepox Microelectronics, Ltd.

www.amepox-mc.com

www.priam-project.eu

PRIAM - “Printable functionalities for truly autonomous, intelligent lighting and signaling system”

Andrzej Mościcki, Andrzej Kinart, Anita Smolarek
Amepox Microelectronics, Ltd., Lodz, Poland
amepox@amepox.com.pl

NAMF 2013 WARSAW

September 09.2013r

The Consortium

Coordinator

Centro Ricerche Fiat S.C.p.A., Italy

CRF CENTRO RICERCHE FIAT

microTEC
Microtec Gesellschaft fuer Mikrotechnologie MbH, Germany

ax mc amepox Microelectronics LTD.
Amepoc Microelectronics LTD.

cea liten
Commissariat a l Energie Atomique et aux Energies Alternatives, France

priam www.priam-project.eu

CRP CENTRO RICERCHE PLAST-OPTICA
Centro Ricerche Plast-Optica Spa,Italy

VTT
Teknologian Tutkimuskeskus VTT, Finland

solari udine
Solari di Udine S.p.A., Italy

Amepox Microelectronics

Who we are?

- Amepox Microelectronics, Ltd. - Since 13.02.1991.
- Our value:
  - High education people,
  - Amepox own plant,
  - Amepox own R&D lab.
- Our products and own technology:
  - Functional materials for electronic and microelectronics applications,
  - Nano size metals – silver range 3 – 8 nm and 50 -60 nm (gold and copper during development stage),
  - Electrically conductive adhesives & pastes
  - Functional inks for microelectronics applications,
- Amepox is a Winner of Several Innovation Awards:
  - 1994 (Selfleveling Floor Materials),
  - 1995 (Silver the Highest Purity Powder),
  - 1996 (Eco Solder Pastes),
  - 2005 (Nanosilver Powder)
- Participant of Several R&D Programmes.

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Amepox Microelectronics

Amepox MC activity on **Nanotechnology** field since 2000 and our work with EU programmes:

FP5 – NANOJOINING

Coordinator – *TNO*

FP6 – STABILIGHT

Coordinator – *UNIPMN*

(Universita del Piemonte Orientale)

F16 Offset Program

FP7 – NanoFate

Coordinator – *NERC*

EUREKA – MAJE

Coordinator – *SPS*

EURIPIDES – CANOPY

Coordinator – *THALES ALENIA SPACE*

FP7 – PRIAM

Coordinator – *CRF*

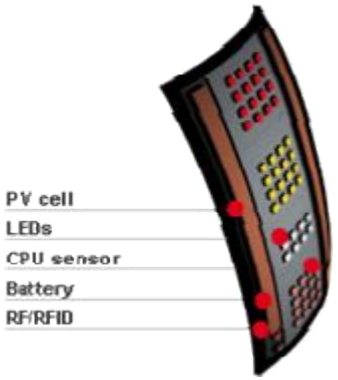
FP7 – NANOTHERM

Coordinator – *THALES ALENIA SPACE*

Project's description:

The main objective of PRIAM was the **development of new autonomous road signals and lighting modules (tail lights) integrating heterogeneous functionalities on plastic foils** by high throughput homogenous processes. Specifically the project addresses the development of two prototypes on a flexible substrate: energy harvesting and storage, communication, control, sensor to measure light intensity, intelligence and light emitters.

LIGHTING



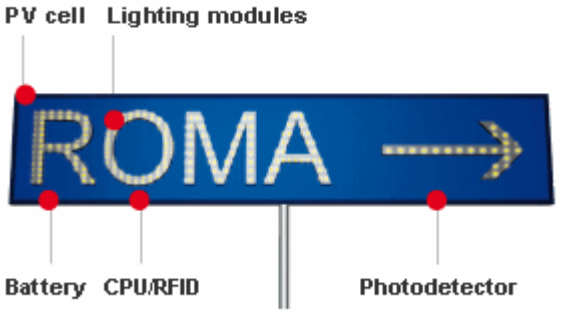
PRIAM addresses the development of two new product families:

- light emitting autonomous road signs;
- autonomous car signals and taillights.

The underlying technology includes a plastic foil containing:

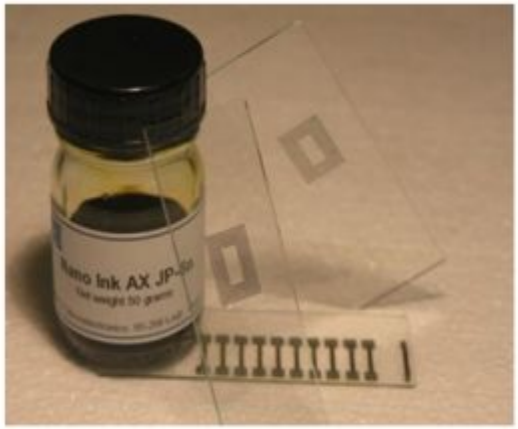
- a solar cell;
- a thin film battery;
- solid state light sources;
- a sensor of ambient light;
- a Radio Frequency RF communication element;
- an energy management processing unit.

SIGNALLING

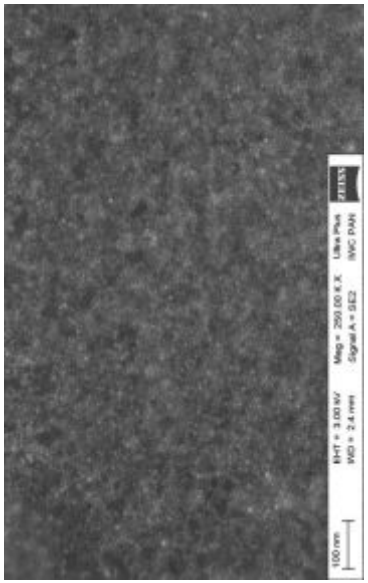


Organization's role in the project

Amepox was involved in the technological development of proper electrical contacts between electro-photonic devices with inorganic light emitting nanostructures, especially with using Jet-Dispenser techniques. Moreover Amepox was involved in the development of novel packaging solutions for the proposed nanophotonic devices.

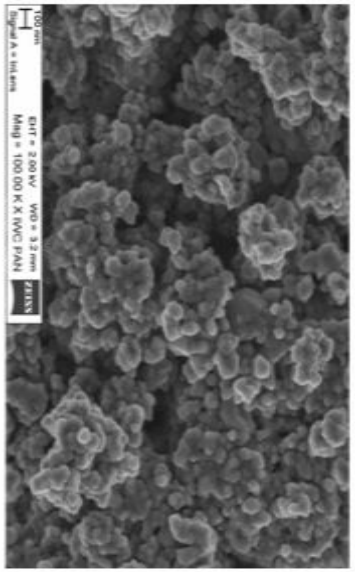


Electrically conductive inks for Ink Jet technology

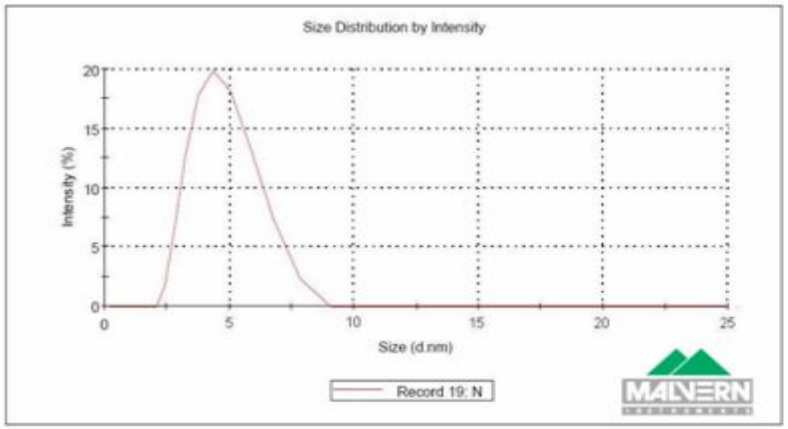


Nanosilver 3-8 nm

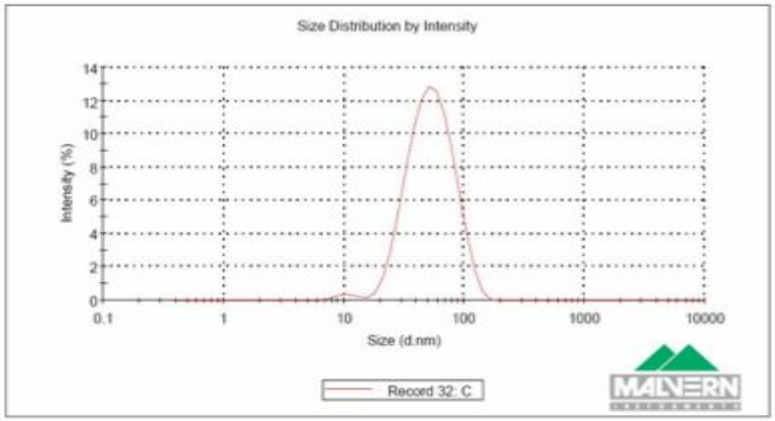
Name	NANO INK AX JP-6n	NANO INK AX JP-60n
Number of components	One	One
Consistency	Very low viscous ink	Very low viscous ink
Color	Dark violet	Dark green to gray
Percentage of silver filler	45 %	20 %
Viscosity	7,5 -10 mPas	5 – 6.5 mPas
Thixotropy index (1/10)	~ 1.0	~ 1.0
Surface tension value	28.5 - 35 mN/m	~35 mN/m
Recommended curing & sintering conditions in convection oven	230 °C – 60 min	150 °C – 60 min.



Nanosilver 40-60 nm



Measurement of particle size „Malvern"



Measurement of particle size „Malvern"

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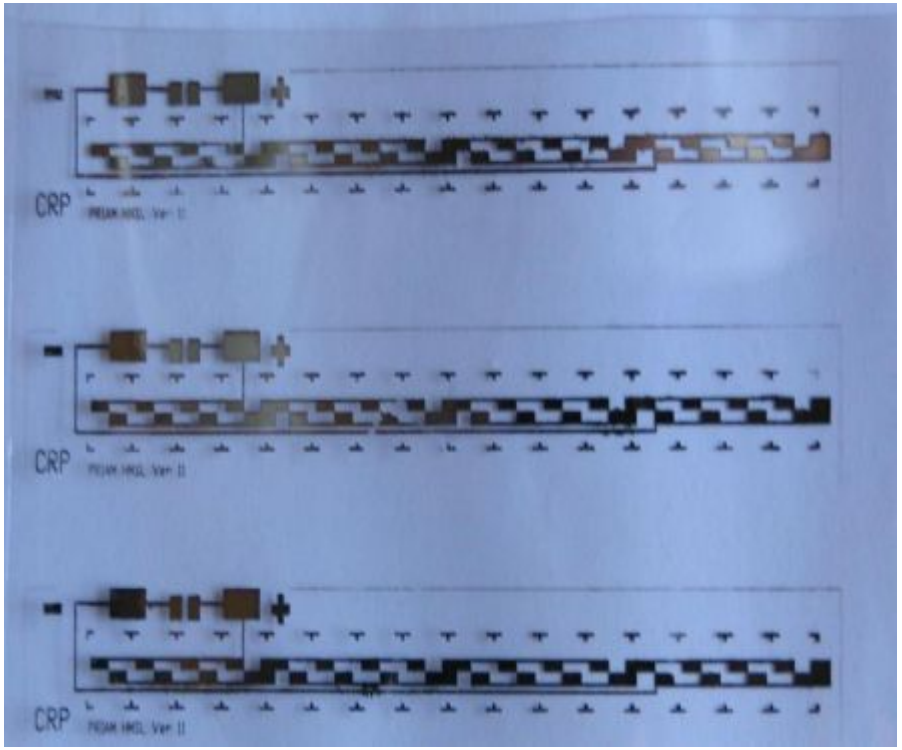
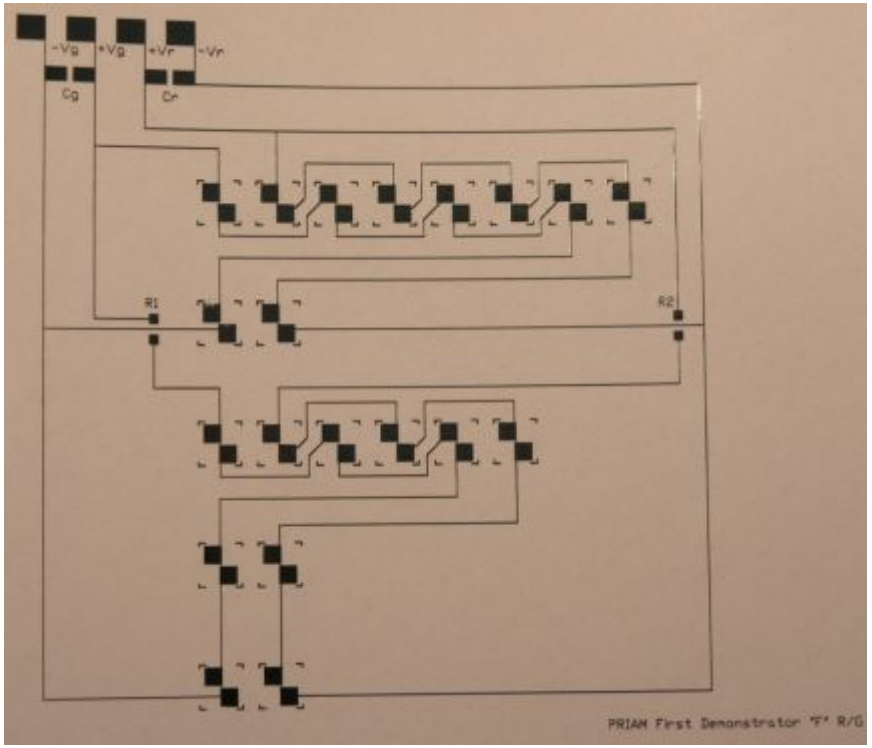
Electronic circuits based on Ink-jet process.



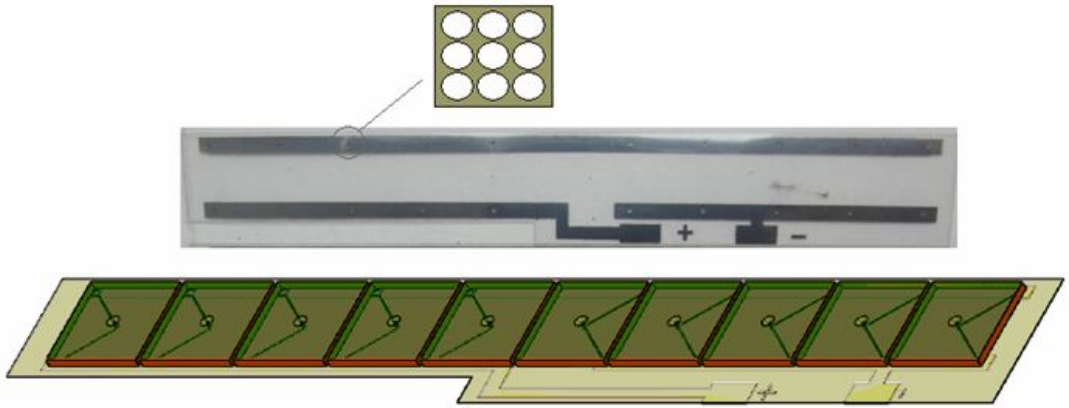
Electronic circuits on the PC foil using nanosilver inks.



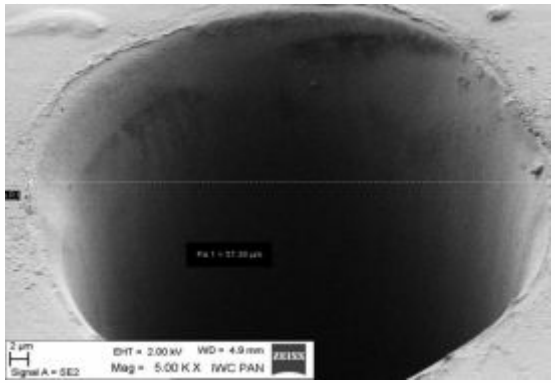
Electronic circuits on the PET foil using nanosilver inks.

Vias Connections by Ink Jet System

Amepox Microelectronics prepared vias'es connection on the flexible substrates using developed new nanosilver inks. This process allows integration of "Laight pad" with the circuits.



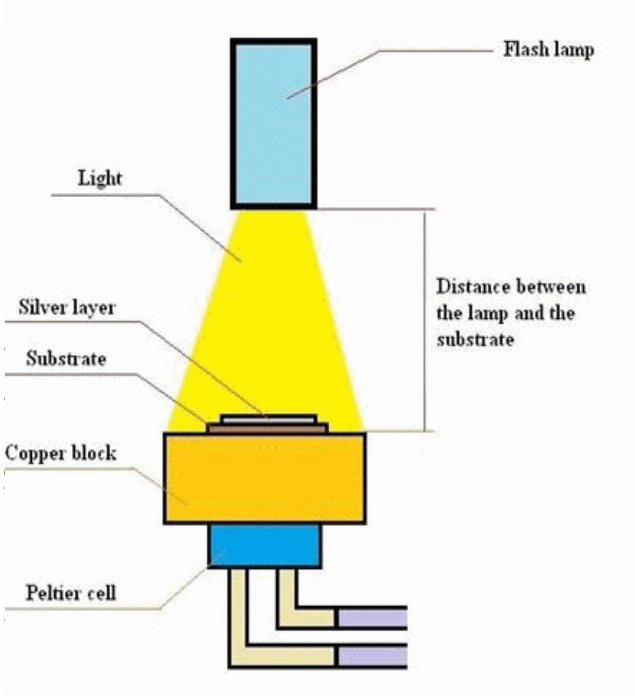
Integration of light pads using ink-jet printing technology.

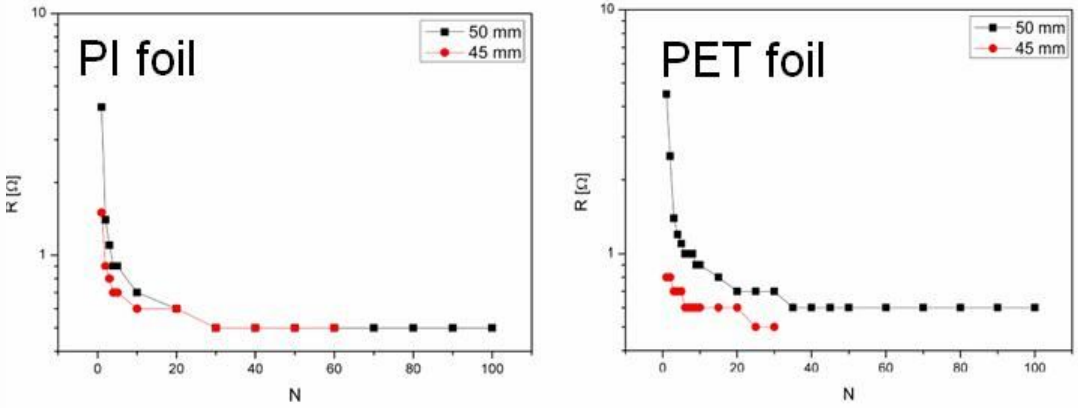


Vias connections

Alternate lighy pads for RCL

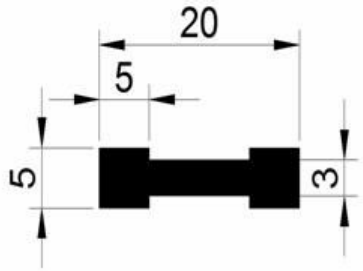
Sintering process using high-energy light pulses





Resistance of the printed structures on PI and PET foil in function of the number of flashes.

$$\rho = \frac{RS}{l},$$



The shape of the printed structures.

Type of substrate	The number of flashes.	Resistance [Ω]	Resistivity [Ωcm]
PI	20	0,41	$6{,}15 \cdot 10^{-6}$
PET	20	2,67	$4 \cdot 10^{-5}$

Thank you for your attention.

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