

## Tri.po.De

**PUBLIC-PRIVATE LABORATORY for the development of Research Technologies and Integration of Polymers in Electronic Devices**

### IMAST members involved:

- **STMicroelectronics Srl**
- **University of Naples “Federico II”** – Department of Physics (**DSF**) and Interdisciplinary research Center in Biomaterial (**CRIB**)
- **CNR** – Institute of Composite and Biomedical Materials (**IMCB**)

### Partners:

- **ENEA** – Italian National Agency for New Technologies, Energy and the Environment
- **University of Salerno** – Department of Engineering of the Information and Electric Engineering (**DIIE**)

The main objective of the TRIPODE project was the creation of a Public-Private Laboratory for the development of low cost technologies to integrate new semiconductor materials, mainly organic, in devices and circuits for electronics and sensors.

### Achievements

New microelectronic technologies were developed, able to realize low-cost electronic devices on rigid and flexible polymeric systems using thin film materials that could be processed at low temperature, compatibly with the polymeric substrates (eg. Semiconductor organic materials deposited by conventional techniques or by direct printing techniques such as ink-jet printing and nanoimprinting).

Particular emphasis was given to the study and development of process technologies for the production of OLED displays and memory devices.

The developed processes were:

- inkjet printing techniques with surface patterning by photolithographic technique; resolution up to  $\sim 1 \mu\text{m}$
- MicroContact Printing; resolution up to  $\sim 0,1 \mu\text{m}$
- NanoImprint Lithography; resolution up to 50 nm

The following devices were realized:

- LED devices with low drive voltage (2.5V)
- non-volatile memory devices made with conjugated organic polymers; switch 2V, ION / IOFF > 10<sup>4</sup> and cyclic and reversible bistability (theoretical density 10Gb/cm<sup>2</sup>, resolution 50nm)
- 3 demonstrators wireless "electronic nose", based on a sensor array of volatile organic compounds (VOCs), tested for terpenes, acetone and ethanol.
- device for active drug delivery: tested for vitamin C
- logic circuit with the function of arithmetic logic unit (ALU) to 4 bits realized on plastic.

