# POLIFLEX

**Polymers and other materials suitable for device fabrication on flexible substrates**

**IMAST members involved:**

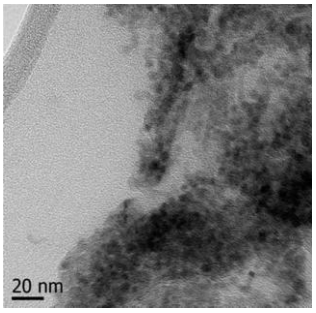
- **University of Naples "Federico II"** Department of Engineering of Materials and Production **(DIMP)**
- **CNR** - Institute of Composite and Biomedical Materials (**IMCB**)
- **ENEA** - Italian National Agency for New Technologies, Energy and the Environment

**Partners**

- **CNR** - National Nanotechnology Laboratory (NNL)

In the frame of the POLIFLEX project functional materials and low-cost technologies suitable for the realization of optoelectronic devices. have been developed.

**Achievements**




Nano-particles of cadmium sulfide (CdS) were synthesized in-situ and ex situ. These nano-particles were used for the realization of PVK-based nano-composites and for the development of polymeric systems with electro-luminescent properties through the dispersion of CdS in a polymer solution of P3HT (poly (3-hexylthiophene) and DH6T (di-hexyl-sexithiophene). Also, the synthesis of two polycarbonate copolymers POC (6.12) with different aliphatic chain containing hole-transporter units (carbazole) and electron-transporter (oxadiazole) in the main chain was carried out. These polymer systems have been used for the development of an ink that has been deposited by ink-jet printing technique on polymer substrate.

A limitation of using polymeric optoelectronic systems is their degradation due to the presence of moisture. For this reason, encapsulation of organic devices to protect them from environmental degradation was performed. A multilayer flexible encapsulation system was developed and verified with Calcium test: calcium, which tends to become transparent when it absorbs moisture is inserted in the multilayer structure. The partial results (full calcium transparency after 8 days) show the possibility to pursue this line of research.

Chemical surface treatments of polyesters were developed in order to increase the polar surface energy contribution and to improve the adhesion between substrate (polymer) and functional layer (inorganic). Moreover, a flexible and transparent multilayer sandwich with low CTE (about 40 ppm / °C) and high Tg (320 °C) was realized.

About technological approach, a platform for nano-structuring has been developed through the development of four techniques: lithography Step and Flash Lithography (SFL), Particle Replication In Nonwetting Templates (PRINT), and nanoprinting electrospinning at room temperature (RT -NIL).