

Organic Electronics: Overview and Applications

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Organic electronics is an emerging technology that promises to cover a wide range of applications. Indeed, the intrinsic characteristics of the organic materials, as the low temperature process, flexibility, biocompatibility and even the biodegradability, make them as the basis for devices for the emerging flexible plastic electronics.

Basic devices for organic electronics are thin film transistors (OTFTs), whose performance is continuously improving in the last years thanks to the development of new organic materials, specifically designed to obtain high carrier mobility and high stability. The field effect mobility of p-type OTFTs fabricated by using both evaporated and solution processed organic semiconductors is now approaching $10 \text{ cm}^2/\text{Vs}$. Furthermore, fabrication processes that use solution processed organic semiconductor inks allow to use printing techniques that enable fabrication process with high throughput and low production costs, required to develop flexible and disposable electronics. Among the most recent applications it is worth mentioning: organic electronic circuits driving electrophoretic ink display, electronic skin, that use devices on ultrathin substrates (the so called “imperceptible electronics”) or on stretchable substrates, medical applications as implantable devices, that exploit the biocompatibility of organic materials. Furthermore, sensor applications can also take advantage from the wide range of different organic materials available for electronic devices and also from the different device structures allowed by organic technology. Organic electrochemical transistors (OECT), have been developed for chemical and biological sensing, and applied, for instance, to control cell activity. The simple OECT device configuration and manufacturing of OECT allows their use in different applications, from very simple wearable sensors to the new devices for bioelectronics