

Flexible Electronic Devices: Principles - Processes and Applications

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Abstract. Organic electronics is rapidly exploding worldwide and it will revolutionize all aspects of our everyday life, since it will lead to fundamental breakthroughs in the way materials, devices and systems are understood, designed and manufactured. The advances in the organic materials (semiconductor, conducting and insulating), inorganic and hybrid materials that exhibit customized properties and stability, and in the synthesis and preparation methods have triggered a significant amount of multidisciplinary research. Furthermore, the development and encapsulation of organic electronic devices onto flexible polymeric substrates by large-scale and low-cost roll-to-roll production processes will result to their widespread adoption in numerous technology areas, including displays, lighting, photovoltaics, radio-frequency identification (RFID) circuitry, and chemical sensors and finally, it will create new applications.

In this work, the advances and prospects of organic materials in the fields of novel active and functional thin films and nano-materials to be used for the production of flexible electronic devices, such as flexible Organic Light Emitting Diodes – OLEDs, and Organic Photovoltaics – OPVs, will be described. Moreover, the major scientific and technological breakthroughs that led to the evolution of thin film technologies will be described, since they will establish the framework for the achievement of the scientific and technological breakthroughs of the future.