

Organic Microelectronics for Transient Smart Devices: A New Opportunity for More Sustainable Electronics

Dr. Eloi Ramon

Researcher at the Institute of Microelectronics of Barcelona (IMB-CNM-CSIC) and leads the Integrated Circuits and Systems (ICAS) group

e-mail: eloi.ramon@imb-cnm.csic.es

Over the past two decades, the rapid evolution of electronics has been driven by the development of novel materials and microfabrication technologies. These advancements have opened new avenues, particularly in the fields of additive manufacturing technologies applied to the fabrication of sustainable, flexible, and organic integrated circuits and systems.

Technological advances in additive manufacturing, printed, and organic electronics offer cost-effective, flexible, biocompatible, sustainable, and eco-friendly solutions for smart and sustainable systems. Printing technologies enable low-cost, large-area coverage with customizable designs.

Since the discovery of organic semiconducting materials 40 years ago, numerous efforts have been made to establish a new application field alongside conventional electronics. In contrast to microelectronics, which is primarily based on silicon, organic electronics has proven to be a viable technology for fabricating devices on plastic, paper, and flexible substrates. This is due to its capability for low-cost, high-volume, and high-throughput production of electronic devices. The introduction of eco-friendly and biodegradable materials to consumer flexible electronics is expected to significantly reduce environmental issues and eliminate the costs and risks associated with recycling operations.

The integration of the aforementioned technologies will pave the way for a wide range of low-cost electronic devices with acceptable lifespans for applications in healthcare, food monitoring, IoT, and many others.