

## Editorial

### Nanotechnology in Printed, Flexible and Organic Electronics

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The first developments in Flexible Electronics extend back to the 1970s, when the first developments in a-SI technologies began. This technology allowed the use of electronic circuits that have special properties related to their mechanical stability, since they are lightweights, rugged, bendable and rollable which resulted in a great developments of the portable devices currently present in our life. Despite of all important developments in this area, in the last decade it has been witnessed an effort to find energy and environmental friendly alternatives for cutting edge technologies and devices which nowadays depend on the use of inorganic materials and technologies, related to the chemical etchings and vacuum environments. As main alternative to these technologies, have emerged in the last years the printing of organic and inorganic materials allowing the development of different devices with different functionalities such as energy harvesting and storage, electronic and biological sensing, conventional decorative and 2D illumination, curved and 2D displays, among others. Printed electronics are made of electronics components that can be processed in the form of liquid solution printed onto different flexible or rigid substrates, turning the developments of the nanotechnologies in real flexible and printed circuits more close of the commercial reality. All the different devices typically used in conventional electronics are currently being developed and improved in printed electronics using semiconducting organic compounds, metal nanoparticles, carbon nanotubes and novel materials resulting by the ongoing worldwide research. Although it is being discovered nano materials with potentially useful electronic properties, there still exists a hard way to go for the commercialization of these new formulated inks. The formulation of new inks and the ways to process are still the most significant challenge for printed electronics for the next years. As substrate, the most widely and more interesting in commercial perspective for printing electronics circuits are polymer substrates, since they allow the development of flexible circuits, opening up a fascinating range of new applications. Contrary to the traditional micro fabrication technologies, like vapour deposition and etching, printed electronics provides many advantages in terms of potential applications and during the process itself. However, the main advantage arises with the possibility of use of roll-to-roll or sheet-to-sheet equipment's that allow a high output production and, in another way, a start-up cost reduction due to the small necessary investment on short runs of custom products. Others advantages are related to the low temperatures of the production, the absence of vacuum and consequently the reducing of the energy costs. Although there is already a high knowledge by companies that

manufacture the equipment needed for this technology, the processes and printing technologies will also require significant developments. These printed technologies open up a whole new area of low-power, low-cost applications, adding smart functionalities to packaging, labelling, garments, large displays and portable and flexible screens. This industry is moving at high speeds at world level being possible to see new products with this technology entering into the market. Hybrid approaches are also being made, combining printed and conventional electronics in final products typically used in major fields like: consumer electronics, printing and packaging, architectural, automotive, pharmaceutical, medical applications and textiles. As example of the actual use of nanotechnology and printed electronics technologies nowadays, is the OLED displays and lighting, packages that light up with electroluminescent devices, touch screens and switches for a variety of synthetic and natural surfaces, flexible solar cells and batteries, heating bands, printed sensors in diabetes test strips and smart packaging for the pharmaceutical industry are just a few examples in which organic and printed electronics and nanotechnology reaches everybody.

The impressive world of nanotechnology allows us to give wings to our imagination, giving our brain the ability to design and create the products of tomorrow. A few years ago, no one imagined that some article of daily use, such as a cell phone or a wristwatch, could become intelligent. At this moment part of these dreams came true. All of these developments are the result of the research in different areas in the world of nanotechnology where the printed and organic electronics it is just a small part, and for these reason we hope that this journal can help you in further research and developments for the contribution of the future emergence of new technologies.

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