The (R)evolution of conventional materials: metal oxides and cellulose

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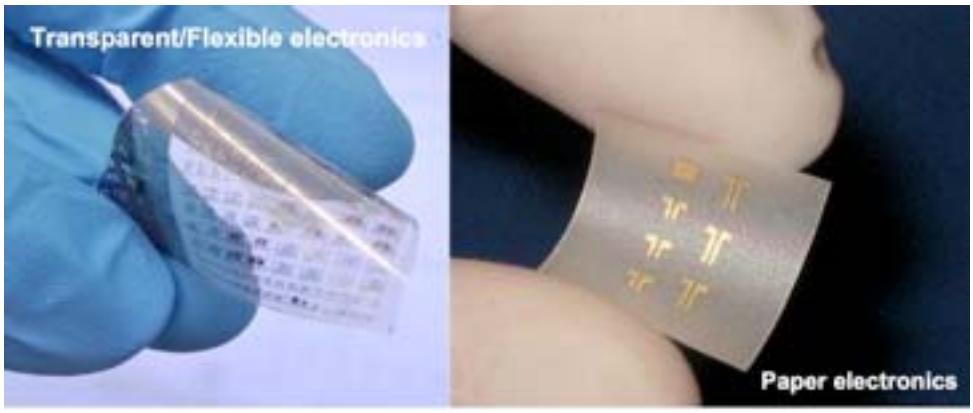
Transparent electronics has arrived and is contributing for generating a free real state electronics that is able to add new electronic functionalities onto surfaces, which currently are not used in this manner and where silicon cannot contribute [1,2]. The already high performance developed n- and p-type TFTs have been processed by physical vapour deposition (PVD) techniques like rf magnetron sputtering at room temperature which is already compatible with the use of low cost and flexible substrates (polymers, cellulose paper, among others). Besides that a tremendous development is coming through solution-based technologies very exciting for ink-jet printing, where the theoretical limitations are becoming practical evidences. In this presentation we will review some of the most promising new technologies for n- and p-type thin film transistors based on oxide semiconductors and its currently and future applications. On the other way round, there is today a strong interest in the use of biopolymers for applications like in the electronic and biomedical or clinic industries, mainly driven by low-cost applications. Cellulose is the earth's major biopolymer and is of tremendous global economic importance. The possibility of developing entirely new kinds of products based on cellulose is of current interest, in order to enhance and to add new functionalities to conventional cellulose fiber based-paper. We briefly present our results aiming the application of paper-based microfluidics in the development of diagnostic tests.



Flexible transparent electronics and paper electronics (paper-e) developed at CENIMAT|I3N.

1) E. Fortunato, P. Barquinha, and R. Martins, "Oxide Semiconductor Thin-Film Transistors: A Review of Recent Advances," Advanced Materials, vol. 24, pp. 2945-2986, Jun 2012.

2) P. Barquinha, R. Martins, L. Pereira and E. Fortunato, Transparent Oxide Electronics: From Materials to Devices. West Sussex: Wiley & Sons (March 2012). ISBN 9780470683736.