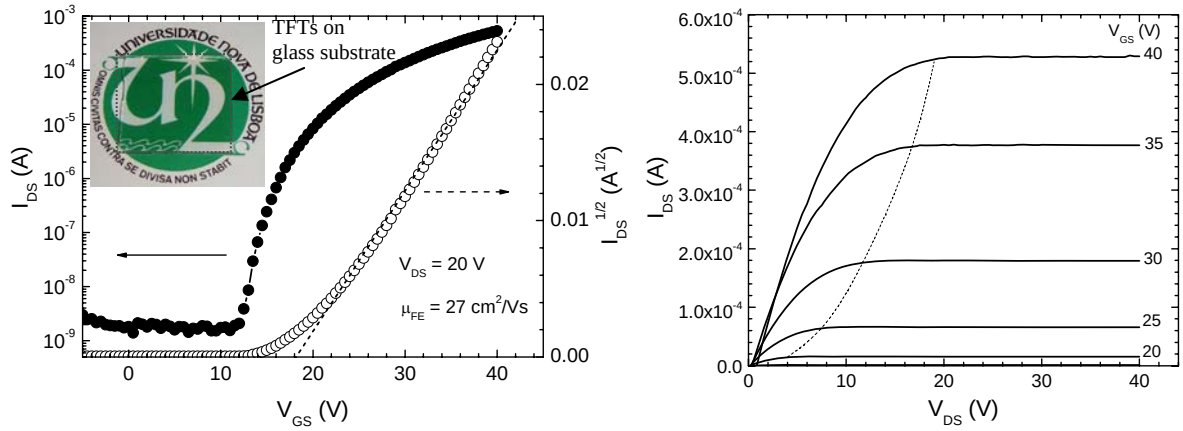
Transparent Electronics

E. Fortunato, P. Barquinha, A. Pimentel, A. Gonçalves, L. Pereira, R. Martins
CENIMAT, Materials Science Department, FCT-UNL and CEMOP-UNINOVA, Campus da Caparica, 2829-516 Caparica, Portugal
e-mail: elvira.fortunato@fct.unl.pt

Transparent electronics are nowadays an emerging technology for the next generation of optoelectronic devices. Oxide semiconductors are very interesting materials because they combine simultaneously high/low conductivity with high visual transparency and have been widely used in a variety of applications (e.g. antistatic coatings, touch display panels, solar cells, flat panel displays, heaters, defrosters, optical coatings, among others) for more than a half-century.

Transparent oxide semiconductor based transistors have recently been proposed using as active channel intrinsic zinc oxide (ZnO) [1,2]. The main advantage of using ZnO deals with the fact that it is possible to growth at/near room temperature high quality polycrystalline ZnO, which is a particular advantage for electronic drivers, where the response speed is of major importance. Besides that, since ZnO is a wide band gap material (3.4 eV), it is transparent in the visible region of the spectra and therefore, also less light sensitive.

In this work we report some of our recent results concerning the fabrication and characterization of high field-effect mobility ZnO-thin film transistor (ZnO-TFT) deposited at room temperature by rf magnetron sputtering.



Typical ZnO-TFT characteristics (a) transfer and (b) output characteristics, with the channel layer deposited at room temperature by rf magnetron sputtering produced at FCT-UNL.

[1] E. Fortunato, P. Barquinha, A. Pimentel, A. Gonçalves, A. Marques, L. Pereira, R. Martins, Appl. Phys. Lett. 85, 2451 (2004).
[2] E. Fortunato, P. Barquinha, A. Pimentel, A. Gonçalves, A. Marques, L. Pereira, R. Martins, Advanced Materials 17, 590 (2005).