

Materials Science Department

Cellulose based substrates for electronics

CENIMAT/I3N Microelectronic and Optoelectronic Group



i3N

INSTITUTO DE
INVESTIGAÇÃO EM
NANOFABRICAÇÃO E
NANOTECNOLOGIA



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2014 – present, PhD student (FCT/UNL)
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Objectives

Design, engineering and testing of:

- Paper's bulk and surface properties in order to explore it as substrate and dielectric in electronic devices.
- Bulk and surface functionalization/modification.
- Device's configuration aiming the application in electronic devices, such as field effect transistors (FETs) and write-erase memory transistors (WERM-FETs).

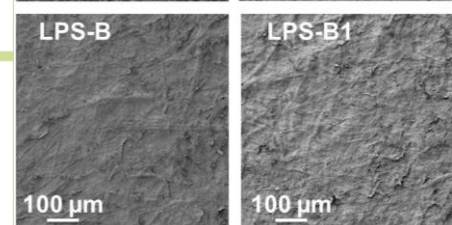
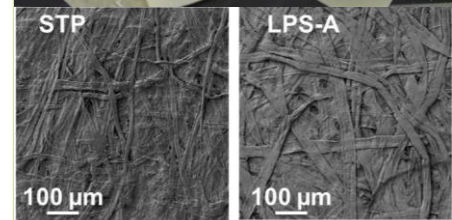
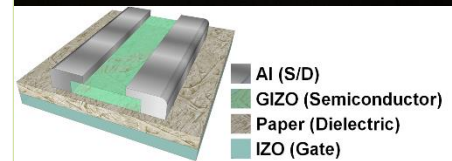
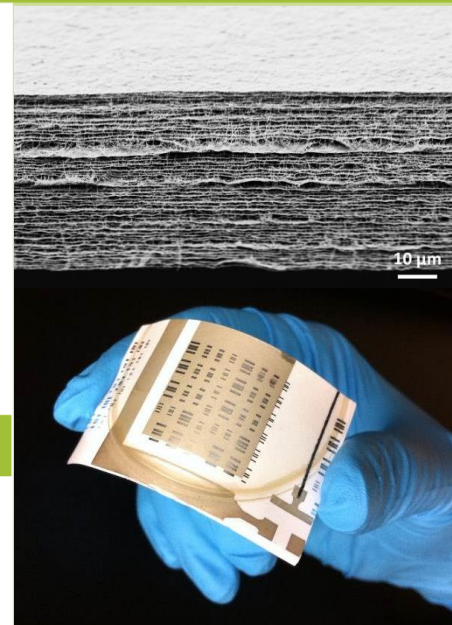
Methodology

Paper tailoring – The work being developed involves paper's tailoring, modification of bulk and surface properties in order to use it as substrate and dielectric in electronic devices. Plasma treatment (changing the hydrophilicity/hydrophobicity of the fibers' surface), addition of extra ionic charge and functionalization/passivation of the fibers' surface with inorganic thin films/nanoparticles are the approaches being used.

Devices production – Transistors with different layout/dimensions will be produced using cellulose fibers as dielectric and PVD deposited conductive and semiconductor oxides

Expected Results

Once the electronic devices based on oxide semiconductors (FETs, memories and inverters) will be produced on top of different paper/cellulose samples, it will be possible to establishing a relation between paper processing/functionalization conditions and transistors electrical performance and stability.



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