SCIENCESPRINGDAY

FACULDADE DE CIÊNCIAS E TECNOLOGIA
UNIVERSIDADE NOVA DE LISBOA

Materials Science Department – CENIMAT|I3N

Multifunctional Materials and Nanodevices

CENIMAT|I3N/ Microelectronic and Optoelectronics Group

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2001 Habilitation in Semiconductor Materials and Microelectronics , UNL

1982 Ph.D. in Semiconductor Materials, UNL

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Objectives

Microelectronics, Optoelectronics and Nanotechnologies

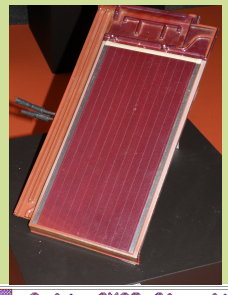
Materials for Energy

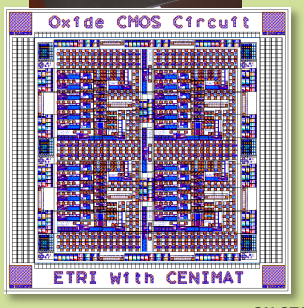
Transparent Electronics (TFTs, CMOS and ICs)

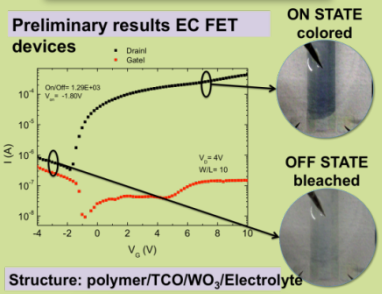
Electrochromic Materials/Devices

Biosensors – Lab-on-Paper and Lab-on-Chip

Paper Electronics







Methodology

More than seventy percent of all technical innovations today depend directly or indirectly on the development of advanced multifunctional materials. Advanced materials have been identified as one of the 6 Key Enabling Technologies, of systemic relevance that feed many different cooperating business sectors, such as the Information and Communication Technologies, Energy and Life Science/ Biotechnology. Therefore, the proper understanding and selection of materials leads to built up functional electronics devices and integrated systems, going from macro to nano scale to which we must use nanotechnologies, not just because we want to downscale devices but because we must reduce as much as possible the amount of materials used to build up the different commodities targeting our societal future challenges and planet sustainability . This is what we do!

Expected Results

1 – MULTI FUNCTIONAL GREEN MATERIALS. Development of degenerated semiconductors with outstanding metal like behavior; new n- and p-type oxide semiconductors and dielectrics; development of novel hybrid nanomaterials for electronics.

2 – TECHNOLOGY processes. Low ion bombardment PVD techniques; low cost solution based technologies as spray pyrolysis, sol-gel, ink-jet and combustion synthesis for low-temperature solution-process semiconductors and dielectrics;

3 – DEVICES. New solar cells concepts based on quantum dots and exploiting plasmonics concepts; oxide thin film transistors (p- and p-type); oxide CMOS devices; oxide logic gates; EIS and ISFETs for bio-diagnostics; paper electronics (discrete devices and ICs) ; electrochromic field effect transistors; flexible and foldable electronic integrated systems; functional nanowires for electronics.

Actual Funding: