# SCIENCESPRINGDAY

FCT FACULDADE DE CIÊNCIAS E TECNOLOGIA UNIVERSIDADE NOVA DE LISBOA

Materials Science Department – CENIMAT|I3N

# Flexible Electronics for Biosensors

CENIMAT|I3N / Microelectronics and Optoelectronics Group

i3N INSTITUTE FOR NANOSTRUCTURES, NANOMODELLING AND NANOFABRICATION

CICGMH

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From 2008 – PosDoc at CENIMAT: Development of ISFET biosensors.

2008 - PhD in Applied Physics, FCT-UNL.

## Objectives

- Thin film devices as transducer for Biosensing: ISFETs (1, 2) and EIS capacitors based on amorphous oxides.
- Optimization and Integration of Parylene as substrate, dielectric and encapsulant for flexible electronics.
- Development of in-situ electrochemical facilities in XRD to study the Li interclation in electrochromic materials.
- Development of AFM methodologies to study nanostructured materials.

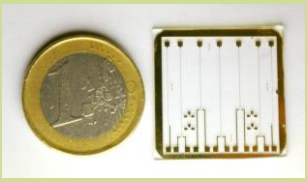
## Methodology

- All layers of ISFETs can be produced by multicomponent amorphous oxides (e.g. Ga-In-Zn oxide, GIZO as the semiconductor, Ta2O5 as the sensitive layer) and are fabricated by Sputtering (3).
- Use of Parylene, deposited by CVD at room temperature, will allow the use of flexible substrates (PET, paper...). As a dielectric, low leakege currents and good electrical properties can be achieved.
- Different substrates to study nanostructures, such as nanoparticles on TetraPAK (4)

## Expected Results

- Top Gate TFTs with Parylene dielectric, processed at temperature <150 °C with good electrical performance ($\mu_{FE}$>10 and 1 $cm^2/Vs$ for n- and p-type TFTs, respectively) and stable operation under electrical and optical stress.
- Fully flexible TFT arrays, using Parylene as substrate, dielectric and passivation layer
- In-situ electrochemical cell for XRD
- C-AFM, KPFM, EFM on Cu2O, VO2 and ZnO nanowires/nanorods by AFM

**1**



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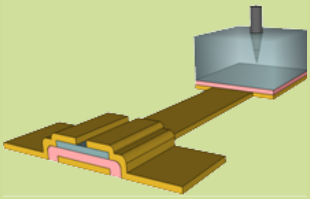
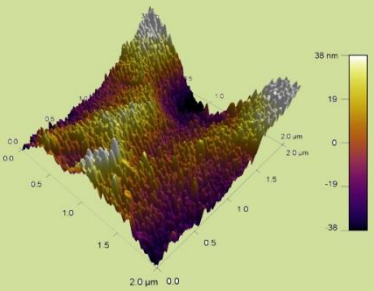


**3**

**4**





Funding:

SEVENTH FRAMEWORK PROGRAMME

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