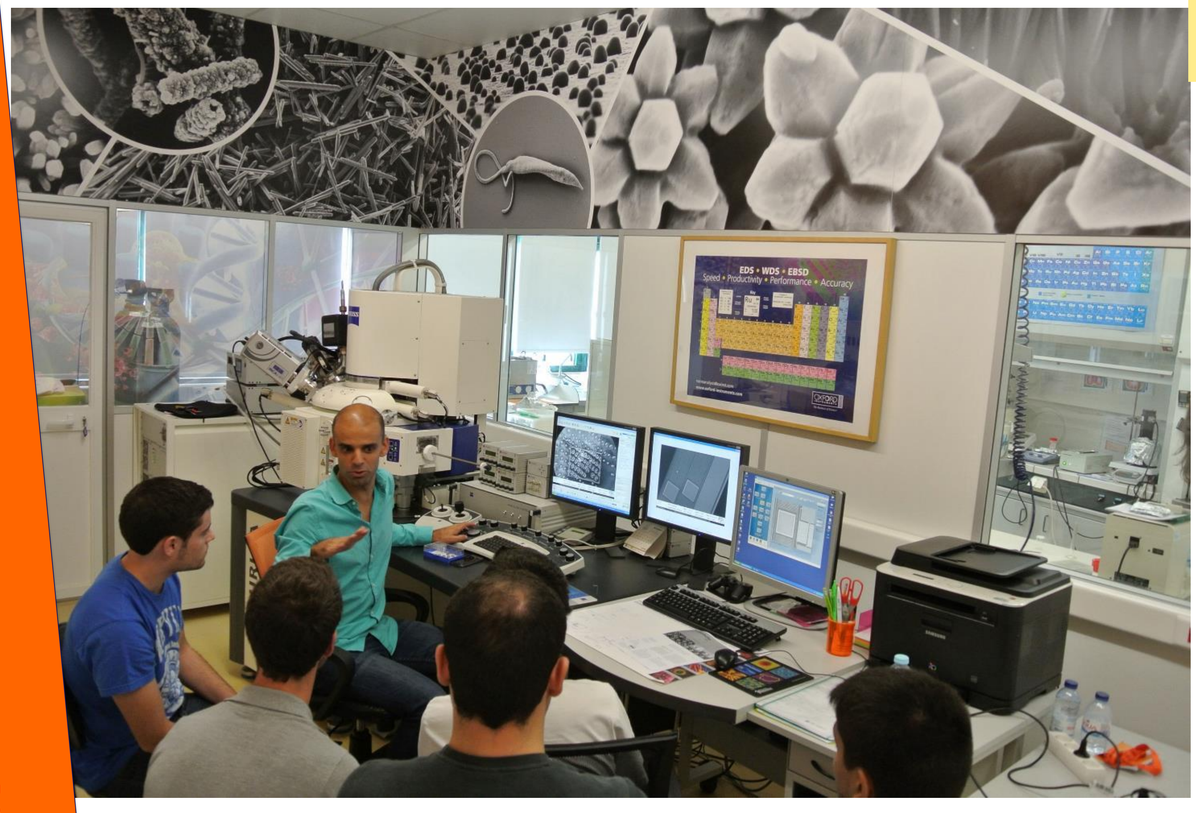
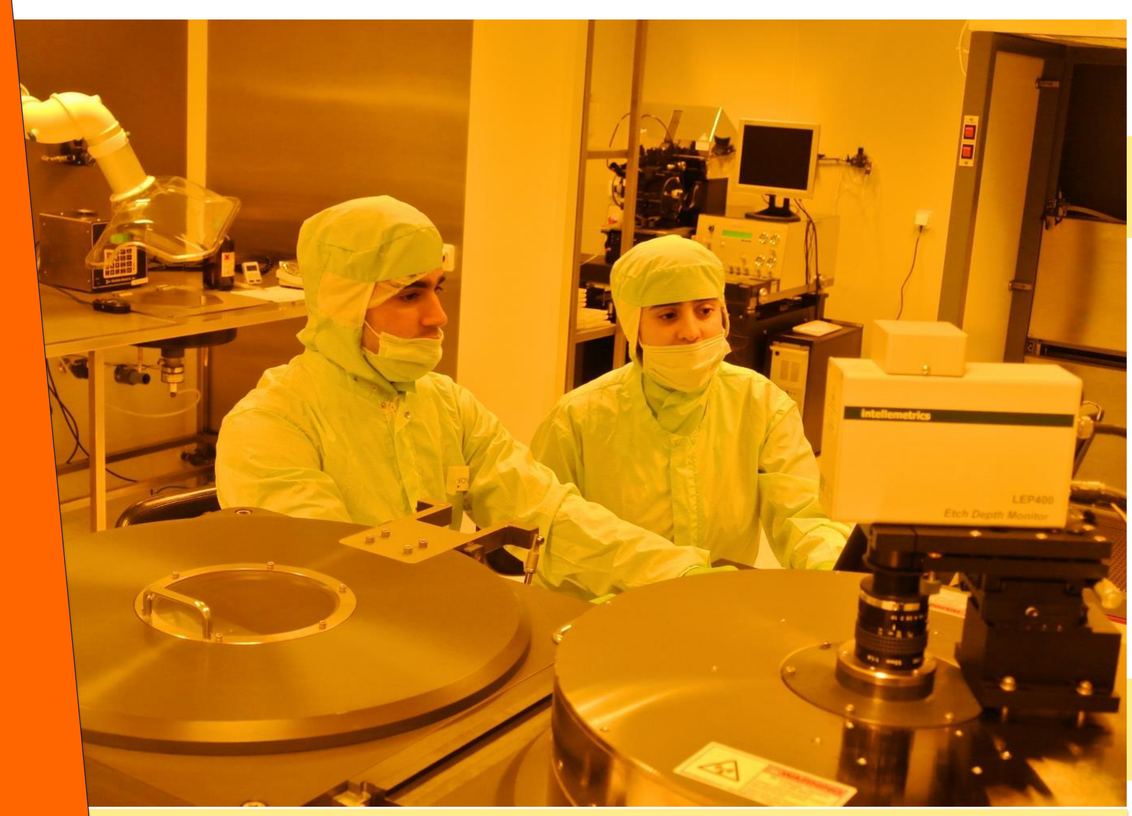
Advanced Functional Materials for Micro and Nanotechnologies

Responsible: Rodrigo Martins

Numbers

Staff:	15
Researchers:	15
PhD students:	32
Grant holders:	26
Technologists:	6
Science Manager:	2





Processing Technologies

Solution processing

Ink-jet; wax-printing; flexo-printing; screen printing; spray-pyrolysis; spin-coating; sol-gel; hydrothermal synthesis (conventional furnace and microwave); combustion synthesis assisted by ultraviolet irradiation, to process Oxide thin films; carbon fibres and nanotubes; metallic and oxide nanoparticles/nanowires; nanofibrils; nanocellulose; electrogels.

Physical vapor deposition

DC and RF magnetron (co-)sputtering; e-beam and thermal evaporation to process Oxide thin films; metal/alloy thin films.

Chemical vapor deposition

Plasma enhanced atomic layer deposition (PEALD); plasma enhanced chemical vapor deposition (PECVD) and hot-wire PECVD; Parylene coating to process Oxide monolayers and thin films; 2D Transition Metal Dichalcogenide (TMD) Nanosheets; Amorphous/micro/poly/nanocrystalline/polymorphous silicon and alloys, doped/undoped thin films.

Patterning/Etching

Direct laser writing (DLW, CO2 and UV 365 nm); Reactive ion etching with inductively coupled plasma (RIE-ICP); Optical mask aligners; Substrate conformable nanoimprint lithography (SCIL, sub-50 nm resolution).

Fibres and additive manufacturing

Fibres extruder; electrospinning; 3D printers for multifunctional applications.

Post-deposition/surface treatments

Rapid thermal annealing (RTA), UV-Ozone, plasma, lasers, conventional and microwave furnaces.

Scientific Areas

- Oxitronics
- Transparent Conductive Materials
- Bio/Paper batteries
- Bio/Nano/Paper electronics
- Functional Nano-particles/ Wires/fibbers
- Nano/Chromogenics
- Microfluidics/Lab-on-Paper
- Micro/Nanoelectronics
- Systems design & architecture
- Plasmonics
- Solar cells
- Thermoelectrics
- Green energy packaging
- Transparent Electronics
- Papertronics & Flexipapertronics

Relevant Publications

- T. Vicente, A. *et al.* **Multifunctional cellulose-paper for light harvesting and smart sensing applications**. *J. Mater. Chem. C* 6, 3143–3181 (2018). **– TOP 10 paper**
- Cardoso, A. R. *et al.* **Molecularly-imprinted chloramphenicol sensor with laser-induced graphene electrodes**. *Biosens. Bioelectron.* 124–125, 167–175 (2019).
- Haque, S. *et al.* **Photonic-structured TiO2 for high-efficiency, flexible and stable Perovskite solar cells**. *Nano Energy* 59, 91–101 (2019).
- Martins, R. *et al.* **Papertronics: Multigate paper transistor for multifunction applications. *Appl. Mater.*** *Today* 12, 402–414 (2018).
- Cramer, T. *et al.* **Passive radiofrequency x-ray dosimeter tag based on flexible radiation-sensitive oxide field-effect transistor**. *Sci. Adv.* 4, eaat1825 (2018).
- Liu, A. *et al.* **Solution Combustion Synthesis: Low-Temperature Processing for p-Type Cu:NiO Thin Films for Transparent Electronics**. *Adv. Mater.* 29, 1701599 (2017).
- Goswami, S. *et al.* **"Electro-Typing" on a Carbon-Nanoparticles-Filled Polymeric Film using Conducting Atomic Force Microscopy**. *Adv. Mater.* 29, 1703079 (2017).
- Panigrahi, S. *et al.* **Imaging the Anomalous Charge Distribution Inside CsPbBr 3 Perovskite Quantum Dots Sensitized Solar Cells**. *ACS Nano* 11, 10214–10221 (2017).
- Carlos, E. *et al.* **UV-Mediated Photochemical Treatment for Low-Temperature Oxide-Based Thin-Film Transistors**. *ACS Appl. Mater. Interfaces* 8, 31100–31108 (2016).

Running Projects (2013-2018)

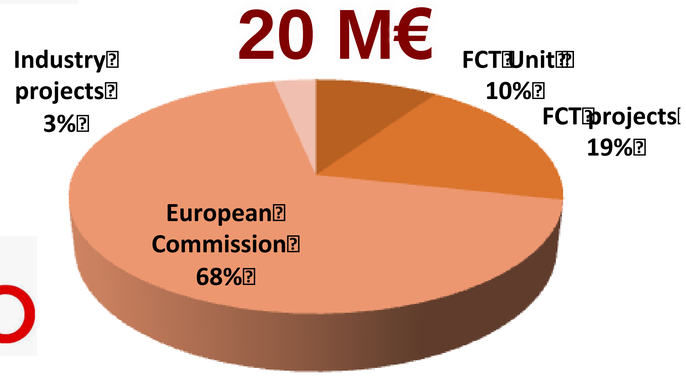
European Research Council

HORIZON 2020

FCT Fundação para a Ciência e a Tecnologia
MINISTÉRIO DA CIÊNCIA, TECNOLOGIA E ENSINO SUPERIOR

PORTUGAL 2020

20 M€



FCT NOVA FACULDADE DE CIÊNCIAS E TECNOLOGIA
UNIVERSIDADE NOVA DE LISBOA

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