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; nanofibres; 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/microcrystalline/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 nanoprint 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/fibers
Nano/Chromogenics
Microfluidics/Lab-on-Paper

Micro/Nanoelectronics
Systems design & architecture
Plasmonics
Solar cells
Thermoelectrics
Green energy packaging
Transparent Electronics
Papertronics & Flexipapertronics

Relevant Publications
- Carlos, E. et al. UV-Mediated Photochemical Treatment for Low-Temperature Oxide-Based Thin-Film Transistors. ACS Appl. Mater. Interfaces 8, 31100–31108 (2016).