



MARIE SKŁODOWSKA-CURIE POSTDOCTORAL FELLOWSHIPS 2021

EXPRESSION OF INTEREST FOR HOSTING MARIE CURIE FELLOWS

HOST INSTITUTION

NOVA University Lisbon | School of Science and Technology

RESEARCH GROUP AND URL

Advanced Functional Materials for Micro and Nanotechnologies (AFMMN)
<https://www.cenimat.fct.unl.pt/>

SUPERVISOR (NAME AND E-MAIL)

Pedro Barquinha
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SHORT CV OF THE SUPERVISOR

Pedro Barquinha, PhD in Nanotechnologies and Nanosciences, NOVA University Lisbon (2010). He is an Associate Professor at the Materials Science Department of NOVA School of Science and Technology (FCT-NOVA) and coordinator of the Doctoral program in Nanotechnologies and Nanosciences of the same university. He has been working in oxide electronics since 2004, participating in >30 national and international research projects in the area, with academia and industry. His work involves design, deposition and characterization of multicomponent oxide thin films, fabrication and characterization of transistors and their integration in circuits on flexible substrates. He is co-author of more than 150 peer-reviewed papers (h-index=48, as July 2021), 3 books and 3 book chapters in this area and gave >50 invited lectures in international scientific conferences and workshops. He also co-authored 4 international patents in the areas of multicomponent oxide dielectrics, p-type oxide semiconductors, paper electronics and x-ray sensing oxide TFTs. In 2016, he got an ERC Starting Grant (TREND) to take oxide electronics towards nanoscale, pursuing low temperature synthesis routes of oxide nanostructures and nanodevice/nanocircuit integration, complemented by device modelling/simulation, targeting multifunctional and self-powered smart surfaces. Within TREND, his team has been establishing processes for the growth of sustainable multicomponent oxide semiconductor nanostructures and giving the first steps into using nanoimprint lithography for oxide electronics. He supervised 5 postdoctoral researchers (+1 ongoing), 4 PhD students (+1 ongoing) and 35 MSc students (+4 ongoing).

5 SELECTED PUBLICATIONS

- J. Neto et al., Transparent and Flexible Electrocardiography Electrode Arrays Based on Silver Nanowire Networks for Neural Recordings, *ACS Appl. Nano Mater.* 2021, 4, 6, 5737–5747. <https://doi.org/10.1021/acsnm.1c00533>
- A. Rovisco et al., Piezoelectricity Enhancement of Nanogenerators Based on PDMS and ZnSnO₃ Nanowires through Microstructuring, *ACS Appl. Mater. Interfaces* 2020, 12, 16, 18421–18430. <https://doi.org/10.1021/acsmi.9b21636>
- A. Rovisco et al., Growth Mechanism of Seed-Layer Free ZnSnO₃ Nanowires: Effect of Physical Parameters, *Nanomaterials* 2019, 9(7), 1002; <https://doi.org/10.3390/nano9071002>
- P. Bahubalindrani et al., High-Gain Transimpedance Amplifier for Flexible Radiation Dosimetry Using InGaZnO TFTs, *IEEE Journal of the Electron Devices Society* 2018, 6, 760-765. <https://doi.org/10.1109/JEDS.2018.2850219>



- C. Fernandes et al., A Sustainable Approach to Flexible Electronics with Zinc-Tin Oxide Thin-Film Transistors, *Advanced Electronic Materials* 2018, 4(7), 1800032. <https://doi.org/10.1002/aelm.201800032>

PROJECT TITLE AND SHORT DESCRIPTION

Soft electronics using composites with embedded oxide nanostructures

While flexible electronics has been widely explored by many groups worldwide, including by the supervisor's group with pioneering work with low-temperature oxides, the conformability of electronics to spherical or curvilinear surfaces, where bending in two directions must occur simultaneously, is still at its infancy. This project proposal seeks to advance this exciting research topic, addressing both material innovation and structural design. For this end, the candidate will have access to the large know-how of the group on the synthesis of nanomaterials and on transistor design, as well as to state-of-the-art infrastructure, including nanoimprint tools suitable for flexible substrates and a wide range of nanocharacterization equipment, such as SEM-FIB with in-situ electrical characterization, XPS and STEM.

SCIENTIFIC AREA WHERE THE PROJECT FITS BEST*

Information Science and Engineering (ENG)