DC 4	High-performance supercapacitors based on $Hf_xZr_{1-x}O_2$ thin films
Host Institution	University of Minho
Supervisor	Luís Marques
Duration	36 months
Subject Area	Materials, Ferroeletrics, energy storage
Doctoral degree	Doctoral Program in Physics (MAP-Fis) or Materials Engineering Doctoral Program at UMINHO

Description

Supercapacitors with high energy storage density, are nowadays in high demand to power IOT sensors. Recently, there has been increasing interest in purely electrostatic solid state supercapacitors based on highly polarizable materials, e.g., ferroelectrics and antiferroelectrics. The UMinho team has large experience in the development of ferroelectric-based capacitors for energy storage applications. However, the performance of these capacitors still needs improvement in terms of energy storage density and efficiency. Therefore, the selected candidate will design novel multilayer structures based on lead-free ferroelectric HZO thin films capacitors and will fabricate them by PVD techniques. The proposed devices may compete with existing commercial devices in terms of energy storage density, temperature operation, charge-discharge time and mechanical stability. The candidate will spend a period of time at the Luxembourg Institute of Technology, TTS and the University of Cambridge to get a deep understanding on these devices.

Project-specific selection criteria:

- Master's degree in materials engineering, physics engineering or physics.
- Affinity to experimental work

Other criteria:

- Highly proficient English language skills.
- Willingness to work collaboratively in a research environment.
- A strong commitment to their own continuous professional development.
- Willingness to travel and work across Europe.

Additional information

As part of the MSCA programme, all recruited MASAUTO researchers must comply with the Horizon Europe MSCA eligibility criteria:

a) Doctoral Candidates must not have a doctoral degree at the date of the recruitment by the host organisation.

b) At the time of recruitment by the host organisation, DCs must not have resided or carried out their main activity (work, studies, etc.) in the country of their host organisation for more than 12 months in the three years immediately prior to the recruitment date. Compulsory national service and/or short stays such as holidays and time spent as part of a procedure for obtaining refugee status under the Geneva Convention are not taken into account.

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