

NanOx4EStor



Nanoscaled ferroelectric (pseudo)-binary oxide thin film supercapacitors for flexible and ultrafast pulsed power electronics

At a Glance

Funded under: M-ERA.NET3

Overall budget: € 642.822,00

Duration: 4 September 2022 – 3 September 2025

Coordinated by: University of Minho, Portugal

NanOx4EStor is implemented through the Joint Call 2021 of M-ERA.NET3, cofunded by the European Union's Horizon 2020 research and innovation programme under grant agreement No 958174.

The Project

The main goal of the **NanOx4EStor** project is to develop innovative and cost effective high-throughput technologies for the fabrication of advanced supercapacitors based on wake-up free (pseudo)-binary oxide thin films, fabricated by physical vapour deposition (PVD) processes, with optimized ferroelectric and energy storage (ES) properties through (i) strain, (ii) interface and (iii) dead-layer engineering.

Objectives

The **NanOx4EStor** vision will be realized by the following **specific objectives**:

1. **Develop energy storage supercapacitors** with energy storage density (ESD) $> 150 \text{ Jcm}^{-3}$, temperature operating range up to $300 \text{ }^\circ\text{C}$, charge/discharge time $< 50 \text{ ns}$ and stability up to 10^9 cycles. These capacitors will find a space for enhanced and innovative applications, such as ES supercapacitors and ferroelectric random access memories (FeRAMs) on flexible substrates.
2. **Design, fabrication and prototyping of an energy storage supercapacitor** to be used in pulsed power applications, such as a DC bus capacitor in electric vehicles. Optimization of its performance as compared to the performance of the existent ones.
3. To perform **comparative analysis of all supercapacitors** processed by physical vapor deposition techniques and to select the most promising ones for industrial applications.

Our studies will enable the development of new or improved flexible and transparent devices such as (i) ES supercapacitors with very high ESD, efficiency, temperature stable and fatigue free and (ii) flexible memories. Moreover, **NanOx4EStor** contributes to the progress of the scientific knowledge in the new and perspective active area of ES supercapacitors, through international scientific cooperation between recognized research groups. In addition, we will contribute to the formation of young students (MSc, PhD) and create a patent related to the fabrication of the proposed energy storage devices.

Consortium

The NanOx4EStor consortium is formed by three partners coming from three different countries, Portugal, Romania and France:



University of Minho
School of Sciences

University of Minho (UMinho),
Portugal



National Institute
of Materials
Physics (NIMP),
Romania



École Centrale de
Lyon (ECL), France

Dissemination



The website of the NanOx4EStor project is online since August 2022. It aims at promoting the project, its activities such as workshops, dissemination activities and competences of our partners. The project URL is: <https://inl.cnrs.fr/projects/nanox4estor/>

 LinkedIn Group

A joint LinkedIn group has been created to communicate the ongoing activities and disseminate the project results. <https://www.linkedin.com/groups/9260371/>



ResearchGate

The project's ResearchGate page will be mostly used for exchanges among members and interested people from the research community.

<https://www.researchgate.net/project/Nanoscaled-ferroelectric-pseudo-binary-oxide-thin-film-supercapacitors-for-flexible-and-ultrafast-pulsed-power-electronics>

Project Meeting

Kick-Off Meeting, November 2022 in University of Minho in Braga, Portugal

The NanOx4EStor Kick-Off Meeting (KOM) took place at the University of Minho premises in Braga (Portugal) on November 29, 2022. The objective of the KOM was to bring together all partners and to set up a common team spirit. During the meeting all participants were made aware of the project's objectives, assumptions, constraints, deliverables, challenges, methodologies, procedures, plans and the working environment.

