



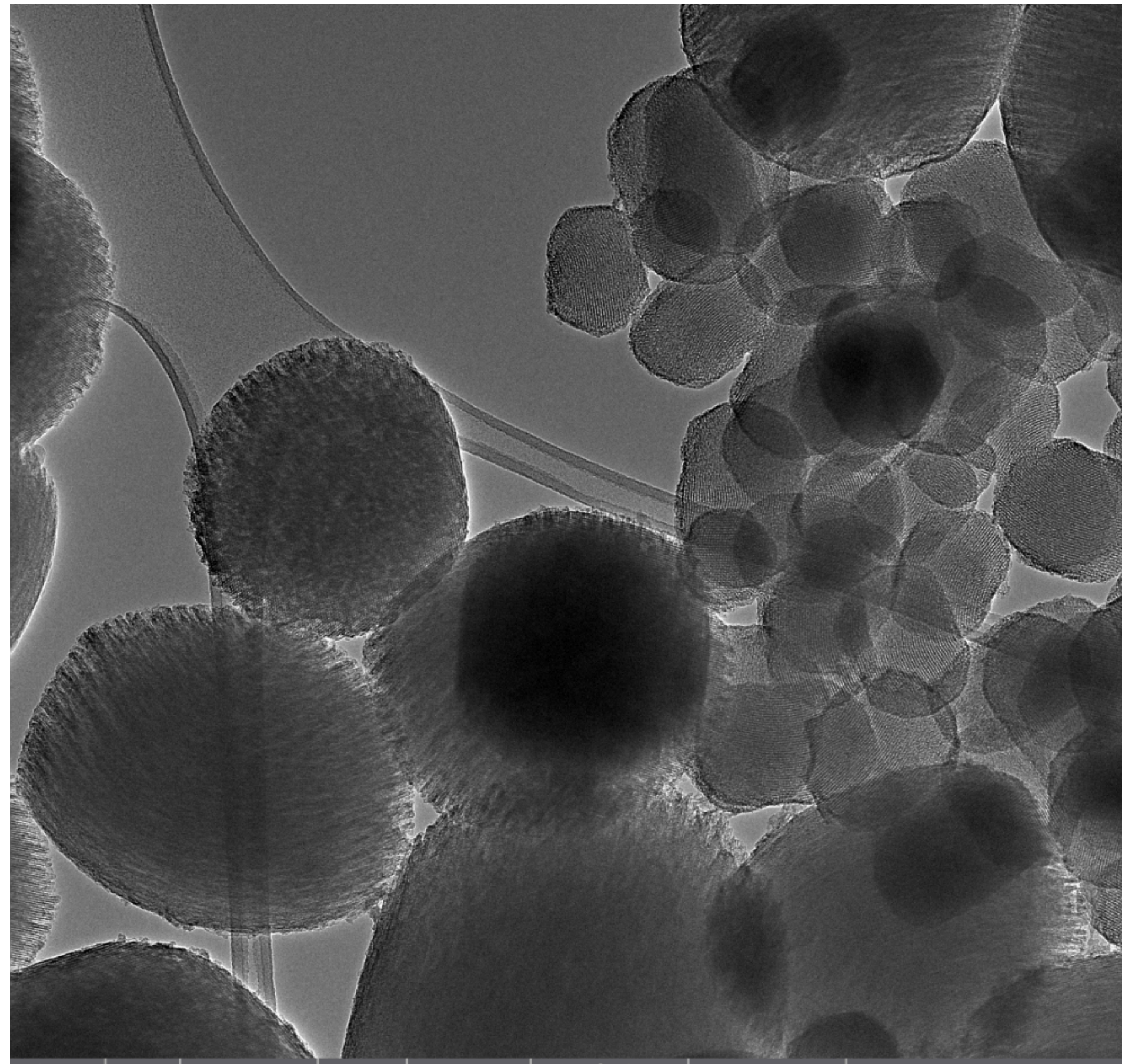
## Project overview

NANOEMCA is a MSCA project that develops mesoporous organosilica confined nanoreactors (PMO NRs) with tailored morphology, high surface area and large pores for advanced applications in water treatment, food preservation, sensing, catalysis and biomedicine. The project builds an international, inter-sectoral network combining academic and non-academic expertise to move from material design to real-world demonstrators.

### Objectives

NANOEMCA focuses on several, interconnected objectives:

- To create novel PMO precursors and metal complexes.
- To develop greener synthesis routes and at least 14 PMO nanoreactors with different morphologies
- To characterise these materials with advanced analytical tools
- To test their use in food, environmental, medical and sensing applications.
- The project also prioritises staff training, mobility, open science, innovation culture and long-term collaboration between partners.



### Main Activities

The research programme is organised into five core work packages plus management and dissemination. It includes:

- Synthesis of precursors and PMO nanoreactors.
- Structural and chemical characterisation; evaluation of antimicrobial, cytotoxic, photocatalytic and biocatalytic properties.
- Development of active packaging, biosensors and gas sensors.
- Testing for wastewater remediation and pollution control. Life Cycle Assessment and Life Cycle Costing are included to evaluate sustainability and scalability from the start.

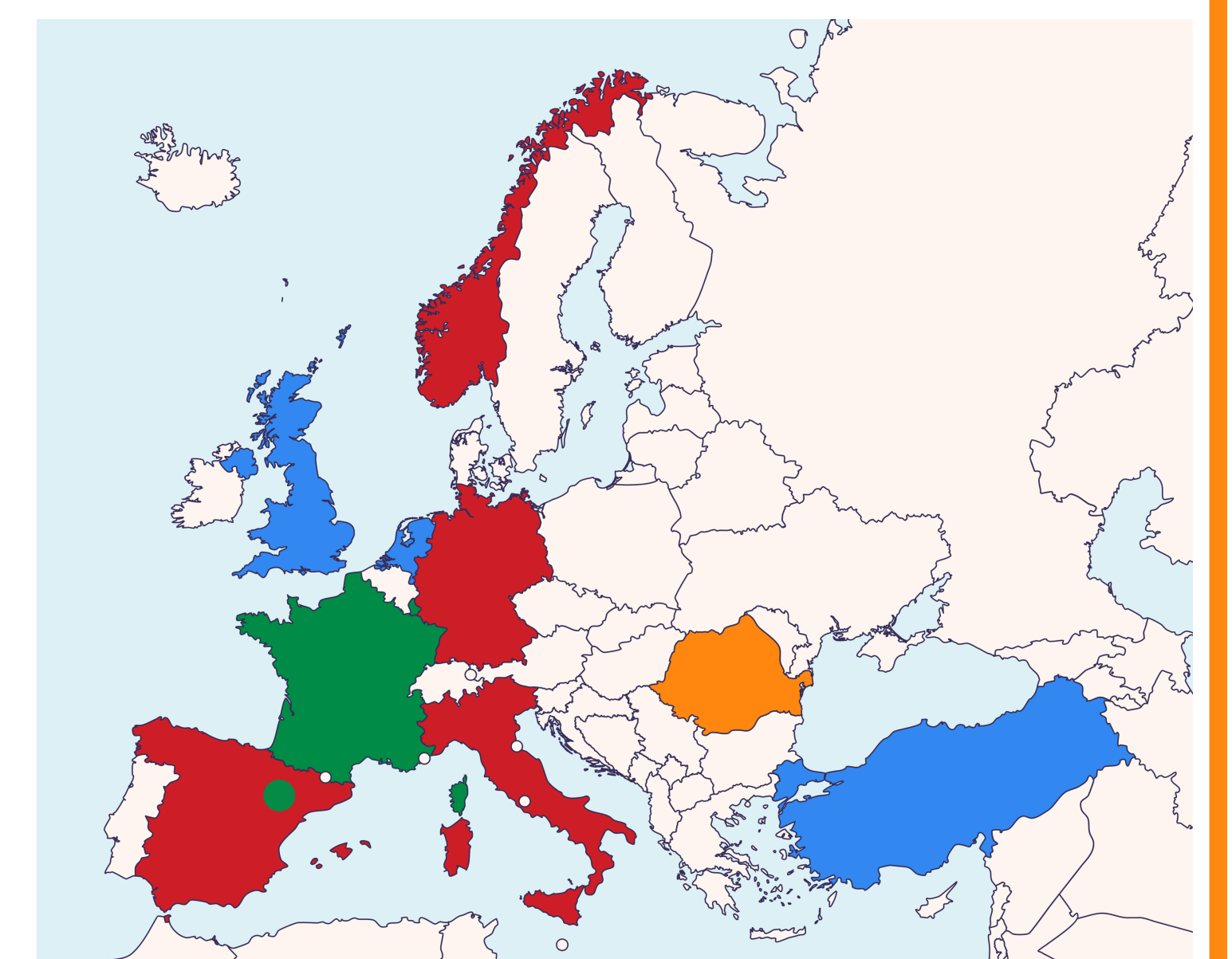
The project also relies on secondments, training modules, workshops, NANOEMCA Café meetings and a final conference to support transfer of knowledge between partners and to build skills for early-career and experienced researchers alike. Open science, open access and FAIR data management are central to the dissemination strategy.

### The consortium

NANOEMCA brings together leading academic labs and specialist SMEs to cover materials design, advanced characterisation, application testing and commercialization.

#### LIST OF PARTNERS

🇪🇺 Coordinator Country   
 🇩🇪 Universities & HEIs   
 🇬🇧 Research & Tech Institutes   
 🇮🇹 SMEs & Industry Partners



### Expected impacts

NANOEMCA is designed to generate both scientific excellence and practical value. The project targets applications in water and wastewater treatment, gas sensing, biosensors and smart food packaging, and expects to deliver at least 10 adsorbents, 4 photocatalysts, 5 gas sensors and 2 biosensors. It also aims for 14 peer-reviewed papers, 14 conference presentations and strong long-term research collaborations, while training researchers and supporting future joint doctoral and postdoctoral work.



#### Social impact

The project supports better tools for protecting health and improving everyday quality of life, through cleaner water, safer food packaging and more sensitive sensors for medical and environmental monitoring. It also strengthens skills and career development by training early-career researchers and building long-term cooperation between universities and industry.

#### Environmental impact

NANOEMCA promotes greener chemistry and more sustainable materials. The project uses lower-impact synthesis routes, evaluates environmental footprint through Life Cycle Assessment, and develops materials that can help remove pollutants from water or support cleaner industrial processes. This makes sustainability part of the design process, not an afterthought.

#### Economical impact

The project aims to move promising materials towards practical use. By creating demonstrators for water treatment, packaging and sensing, and by working closely with SMEs and industry partners, NANOEMCA helps open pathways for scale-up, innovation and future commercial applications.

