




**CERENA**

Centro de Recursos  
Naturais e Ambiente

CERENA SEMINARS  
2024/2025



**Next Generation Science**  
Building a Path to Sustainability



Scientific knowledge adapts to the times and responds to societal challenges. Research topics that were groundbreaking 30 years ago have since become established knowledge, often taken for granted today. The future is unfolding now, and the actions we take in the present shape the trajectory of scientific progress in the near and distant future.

With that in mind, we are excited to announce a new cycle of CERENA seminars! This year brings a fresh twist – seminars will be led by our early career researchers (aka PhD students). Young scientists are at the forefront of addressing today's challenges and represent the driving force behind scientific advancement. In a world that too often ignores the ideas, opinions, and voices of younger generations, the 2024/2025 CERENA seminar series will be a platform for emerging researchers to showcase their work and views on the future of science. Topics will range from environmental management and renewable energy transitions to remediation strategies and total recycling solutions.

We invite you to join us on this journey, attending our monthly seminars held on the last Thursday of each month (with potential date changes, so stay tuned). Mark your calendars, follow our updates, and take advantage of this unique opportunity to witness the creation of tomorrow's science today.

CERENA SEMINARS 24/25  
September 26<sup>th</sup> 2024 | 12:30  
Room C13 IST  
Room F405 FEUP

## Can MOFs be used for CO<sub>2</sub> separation by adsorption in the industry?

Metal-organic frameworks (MOFs) are porous materials made from metal ions connected by organic molecules that can capture and store CO<sub>2</sub>. One method to separate CO<sub>2</sub> from other gases is called pressure-swing adsorption (PSA), which is easy to add to existing plants and straightforward to use. This study looks at how well MOFs work in PSA for separating CO<sub>2</sub> in industrial settings.



**Marta Bordonhos, PhD student**  
Chemical Engineering  
Instituto Superior Técnico

CERENA SEMINARS 24/25  
October 31<sup>st</sup> 2024 | 12:30  
Room C13 IST  
Room F405 FEUP

## Advanced Methods for Ocean Climate Modelling

The behavior of ocean currents is affected by variations in temperature and acidity, worsening the effects of climate change on the Earth's heat regulation system. Mapping and modelling temperatures and salinity distribution is important to understand these ocean processes. This work combines data that already exists at various scales into highly detailed 3D modelling.



**Filipa Duarte, PhD student**  
Earth Resources  
Instituto Superior Técnico

CERENA SEMINARS 24/25

November 28<sup>th</sup> 2024 | 12:30

Room C13 IST

Room F405 FEUP

## Impact of naturally occurring radioactive materials in water treatment facilities

Natural radioactive materials (NORM) are typically found at low concentrations in water, soil, and rocks. Natural processes and human activities can lead to the accumulation of these radionuclides at high concentrations, increasing radiological exposure. This work aims to assess the environmental and health risks associated with NORM in water supply systems and to explore innovative methods for their removal using porous microspheres with immobilized catalysts.



**Zaid Al-Shomali, PhD student**  
Environmental Engineering  
FEUP

CERENA SEMINARS 24/25

December 19<sup>th</sup> 2024 | 12:30

Room C13 IST

Room F405 FEUP

## Mapping and monitoring vegetation of the Antarctic Peninsula

The temporal comparison of vegetation cover in the Antarctic Peninsula over the years can help determine the impacts of climate change in this region. This new remote sensing methodology combines drone and satellite images with classifier algorithms to obtain validated high-resolution maps of vegetation patches.



**Vasco Miranda, PhD student**  
Earth Resources  
Instituto Superior Técnico

CERENA SEMINARS 24/25

January 27<sup>th</sup> 2025 | 12:30

Room C13 IST

Room F405 FEUP

## **Transforming biomass into syngas: innovative water co-electrolysis**

The search for sustainable alternatives to fossil fuels is urgent, especially in the Mediterranean region. Climate change, increased agriculture, and neglected forests are causing frequent and destructive wildfires. This study aims to produce synthetic biofuels by converting liquefied forest biomass into synthesis gas using solar energy, and evaluates the economic and environmental impacts of the process.

**Sila Özkan, PhD student**  
Chemical Engineering  
ISEL



CERENA SEMINARS 24/25

February 27<sup>th</sup> 2025 | 12:30

Room C13 IST

Room F405 FEUP

## Total Plastic Recycling: Contributions to Circular Economy



**Teresa Nogueira, PhD student**  
Chemical Engineering  
Instituto Superior Técnico

Plastic materials range from simple to complex multilayer composites, often used in food packaging. Composite materials improve specific properties for certain applications but are hard to recycle mechanically. Pyrolysis is a promising solution for chemical recycling: a lab-scale study found that the liquid and gaseous residues are mainly hydrocarbons.



CERENA SEMINARS 24/25

March 27<sup>th</sup> 2025 | 12:30

Room C13 IST

Room F405 FEUP



## Exploring the Patterns of Drought Events in Southern Portugal

**Geostatistical techniques combined with drought indicators like precipitation, soil moisture and groundwater levels show us how drought patterns have evolved over recent decades. This work provides insights into potential future drought risks for Southern Portugal.**



**Miguel Gomes, PhD student**  
Earth Resources  
Instituto Superior Técnico

CERENA SEMINARS 24/25

April 24<sup>th</sup> 2025 | 12:30

Room C13 IST

Room F405 FEUP

## The impact of impurities on carbon capture, utilization and storage

Carbon capture utilization and storage is one of the paths to reduce greenhouse gas emissions. Since the 1970s, CO<sub>2</sub> has been injected underground for oil recovery or storage, but impurities from fossil fuel plants make this process less efficient by affecting CO<sub>2</sub> capture, transport, and storage. This study examines how impurities affect CO<sub>2</sub> capture and storage methods, and evaluates the technical and economic challenges of handling impure CO<sub>2</sub>, considering the energy required for purification.

**Shahmir Ali Noshervani, PhD student**  
Chemical Engineering  
Instituto Superior Técnico



CERENA SEMINARS 24/25

May 29<sup>th</sup> 2025 | 12:30

Room C13 IST

Room F405 FEUP

## Vulnerability of Portuguese natural stone to high temperatures

Natural stone faces growing threats from climate change and fires, but remains a top choice for construction due to its durability and environmental benefits. This research explores how high temperatures threaten the durability of natural stone, focusing on ten Portuguese limestones. Preliminary results indicate that heating increases limestone's absorption, porosity, and density due to thermal cracks, emphasizing the importance of understanding limestone's heat resilience for sustainable construction and conservation efforts.



**Roberta Lobarinhas, PhD student**  
Earth Resources  
Instituto Superior Técnico

CERENA SEMINARS 24/25

June 26<sup>th</sup> 2025 | 12:30

Room C13 IST

Room F405 FEUP

## Abandoned mines in Portugal: toxic elements and environmental damage

We studied six abandoned mining areas in Central-Northern Portugal, a region with nearly 400 inventoried abandoned mining sites. We sampled the soil in each area to conduct chemical lab tests to detect the presence of potentially toxic elements. Geostatistical analysis provides insights into the potential environmental risks of these areas.



**Bárbara Fonseca, PhD student**  
Mining Engineering & Georesources  
FEUP

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INSTITUTO SUPERIOR DE  
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until we meet again



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