MEON Seminar Slot

11th December 2024, 15h, CENIMAT

Title: Next-Gen Solar-Powered CO_2-to-Fuel Conversion using Nanostructured Bio-Based Aerogels

Abstract

Efficiently transforming renewable into chemical energy stands as a key milestone to a successful energy transition. Electrochemical conversion processes are generating immense anticipation, as their success critically depends on the efficiency of electrocatalysts driving the key chemical transformations. Aerogels are unique highly porous, lightweight structures, with tunable physicochemical properties believed to play a prominent role in the future of energy related technologies. This work aims to develop nanostructured bio-based aerogel materials to be applied as cathodes in the co-electrolysis of CO_2 and water to produce synthetic fuels (powered by solar photovoltaics, PV). Europe is undergoing a transformative shift towards a decarbonized energy system, driven by ambitious goals to reduce emissions by 45% by 2030 and limit energy-related CO_2 emissions to 770 megatons per year by 2050. The work's innovative character is rooted in circular economy and sustainability concepts, fully aligned with decarbonization goals and the anticipated energy transition. Besides the storage of renewable energy, this technology will allow us to recycle waste CO_2, bringing carbon back into the value chain and therefore contributing to a circular carbon economy. In this context, electro-catalysts with high activity and lifetime suitable for an industrial application are still lacking. An innovative approach focused on the exploitation of bio-based materials will be explored in the preparation of bimetallic monolithic pore engineered aerogel cathodes. The design process of nanostructured aerogels from renewable resources is gaining increasing interest for several reasons: environmental impact reduction, decreasing dependence on fossil fuels, and lowering the carbon footprint in agreement with sustainable development.

Speaker – Inês Paninho

Inês Paninho completed a European PhD in Sustainable Chemistry funded by FCT. She has made impactful contributions to harnessing CO_2 as a sustainable carbon source, advancing the field of green chemistry and carbon utilization. Her PhD research, conducted as part of a European program across 3 countries, resulted in the development of innovative strategies for producing cyclic carbonates from CO_2. This involved the design of nanostructured materials with high porosity and tunable properties, a novel approach that was developed through international research stays in Spain and Germany. Inês's postdoctoral research has expanded into advanced biofuel production, where she integrates green hydrogen technologies with innovative porous materials for electrolyzers. Currently, she is main researcher in M-EC02 project at CENIMAT|i3N, supported by PRR and working directly with industry, specifically with PRIO Energy.