12:00

18th June 2024

Sala de Grados

Facultad de Ciencias

Towards high-performance membranes for sustainable energy and environmental remediation

Dr. Beatriz Zornoza

The climate change that the planet is experiencing leads to the urgent need to reduce greenhouse gas emissions, mainly CO_2, into the atmosphere. Decarbonizing the energy system of transport, buildings, and industry (specifically energy-intensive chemical, cement, or steel industries) is crucial to reach the environmental, energy, and climate objectives and for Europe to become carbon neutral by 2050. Aiming to address these pressing goals my research has focused on the progress of Membrane Technology. Membranes, with low carbon footprint, and easy operation and scaling are a key technology in the separation processes for efficient and environmentally friendly energy generation. Polymer membranes are already commercial but are relatively low-selective, showing a trade-off between permeability and selectivity. These two parameters can be highly enhanced by incorporating advanced nanotechnological materials, such as metal-organic frameworks (MOF), which allow to extract their potential as molecular sieves and adsorbents forming the known mixed-matrix membranes. Currently, to reduce the high fabrication costs of these novel membranes, investigation is directed toward the fabrication of ultra-thin films. In this talk, we will take a tour of membrane preparation methodologies for efficient energy production and environmental sustainability.

INMA INSTITUTO DE NANOCIENCIA Y MATERIALES DE ARAGÓN

CSIC Consejo Superior de Investigaciones Científicas

Universidad Zaragoza 1542

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The New Role of Liquid Crystals: Disruptive Innovations in Energy, Sensing, Optics, and Healthcare

Dr. Alberto Concellón

Liquid crystals (LCs) are fascinating soft materials that combine molecular order and mobility. Since their discovery by Reinitzer in 1888, LCs have been studied for over 130 years across multiple disciplines, including chemistry, physics, and engineering. This research has led to significant advances in both basic science and technology. The development of flat-panel displays (e.g., LCD TVs) is a prime example, having revolutionized daily life and grown into a multi-billion-dollar industry. In recent decades, the application of nanostructured LCs has expanded into diverse fields to meet current technological and societal needs. These applications include energy transport, environmental separation, sensing, electro-optics, actuation, and biotechnology. The new molecular designs and the ability to statically and dynamically control molecular orientation and hierarchical structures from the nanometer scale to the macroscale are essential for these functions. In this seminar, I will focus on the design of new self-assembled structures for LC materials and their potential applications as unique nanostructured materials.