INSTITUTO DE CIENCIA MOLECULAR
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EXCELENCIA MARÍA DE MAEZTU

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#ICMolTalks

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June 30 · 14:30 h

Assembly Hall - ICMol

Abstract

Interface Engineering in Halide Perovskites

Halide perovskites have emerged as outstanding semiconductors for next-generation photovoltaics and optoelectronic devices, combining excellent optoelectronic properties with low-cost solution processability. Despite their rapid development, interfacial defects and surface instability remain key factors limiting device efficiency and long-term operational stability.

This seminar will present recent advances in interface engineering strategies aimed at controlling the chemical and electronic properties of halide perovskite surfaces. Different approaches to defect passivation, energy-level tuning, and charge transport optimization in lead-based perovskite solar cells will be discussed.

Particular attention will be devoted to the use of low-temperature plasma treatments as a versatile and scalable tool for surface functionalization. Examples on both lead- and tin-based halide perovskites will show how plasma-assisted processes can tailor surface chemistry, reduce defect density, improve interfacial charge transfer, and enhance material stability while preserving the intrinsic properties of these highly sensitive semiconductors.

The seminar will conclude by discussing how advanced interface engineering can contribute to the development of efficient, stable, and more sustainable perovskite-based optoelectronic technologies.

Biography

Silvia Colella is a Senior Researcher and Head of the Bari Division (Italy) of the Institute of Nanotechnology (CNR Nanotec), National Research Council of Italy (CNR). She has developed her career across both academia, with research experience at the Institut de Science et d'Ingénierie Supramoléculaires (ISIS), University of Münster, the University of Salento, and CNR, and industry, at BASF. Her research focuses on the chemistry, synthesis, and engineering of halide perovskites and other advanced materials for next-generation photovoltaics and optoelectronic applications. She has extensive expertise in developing innovative materials and processes for solar energy conversion, bridging fundamental research and technological innovation. She has authored more than 100 scientific publications, is co-inventor of four patents, and actively collaborates with academic and industrial partners on advanced materials for sustainable energy technologies.