Plenary Speakers

IDENTITY

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Short Biography

Emiliano is a Professor of Experimental Physics and Energy Conversion at the University of Munich (LMU), Germany, and leads the Nanomaterials for Energy group. He is also a visiting researcher at the Materials Departments of Tianjin University, China, and Imperial College London, UK. Since 2024, he is also Associate Researcher at the TUM Catalysis Research Center in Munich.

His research, bridging chemistry and physics, focuses on developing novel nanomaterials and techniques for energy conversion. Emiliano has published over 150 scientific articles, one book, and four patents.

He is a PI in the German excellence research cluster e-conversion, coordinator of its graduate program, and serves on the scientific board of the Center for NanoScience (CeNS) in Munich. He is also a member of the Bavarian Solar Technologies go Hybrid (SolTech) program, fellow of the Young Academy of Europe (YAE), and CSO of INSyT Technologies, a start-up from his group.

He has received multiple awards, including ERC grants and the Royal Society of Chemistry "Emerging Investigator in Materials Science" award. He sits on the editorial boards of several journals, including ACS Nano and ACS Energy Letters.

Title of Oral Presentation

Light-driven nanomaterials and technologies for energy conversion and storage

Keywords (5 words max)

nanomaterials, energy, plasmonics, microscopy, catalysis

Abstract of Oral Presentation

The urgent need to mitigate climate change calls for transformative approaches in our current energy management and associated technologies, particularly those that address carbon dioxide emissions, hydrogen generation and energy storage. Photonic concepts and innovative light-driven technologies present promising pathways to enhance energy efficiency and sustainability [1]. By harnessing the power of light, these advanced nanomaterials and technologies can revolutionize the way we generate, store, and consume energy across industries, from manufacturing to transportation [2]. At the heart of this transformation lies the fundamental role of photonic processes in the Earth's energy balance, where rising CO2 levels disrupt sunlight absorption and thermal radiation. Addressing this challenge requires a shift toward energy systems that optimize light harvesting and minimize CO2 emissions, including through the use of plasmonic and photonic nanomaterials that enable more efficient energy conversion at the nanoscale [3-5].

In this presentation, I will share our recent research into the energy conversion processes at the single-particle level, specifically focusing on the relationship between plasmonic photocatalytic activity, reactivity, temperature, and nanoscale energy flow [6-7]. Our findings aim to inform the rational design of future nanocatalysts for applications in photocatalysis, temperature management, and beyond [8-10].

Furthermore, I will discuss the application of interferometric scattering techniques to study energy materials, which has led to breakthroughs in sustainable material synthesis, prevention of solar cell degradation, and enhanced understanding of ionic behavior in battery materials [11]. These optical methods not only advance our understanding of energy flow at the nanoscale but also open new avenues for developing multifunctional, earth-abundant materials that drive energy efficiency and long-term sustainability [12].

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