

SCIENTIFIC SYMPOSIUM PROMETEO 2025

“LIGTH-DRIVEN ADVANCED MATERIALS”

December 4th 2025

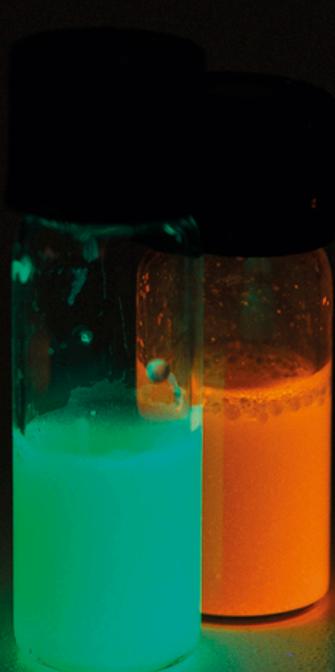
15:00h-18:30h

Facultad de Química

Salón de Grados,
Bloque E, 1^a planta
c/ Doctor Moliner 50

Organized by: Photochemistry Reactivity Group

Subvención Prometeo 2023 de la Conselleria de Educació, Cultura, Universidades y Empleo.



Invited speakers



Prof. Santi Nonell
IQS School of
Engineering,
(University Ramon
Llull, Barcelona, Spain)



Prof. Concepción Gimeno
Instituto de Síntesis
Química y Catálisis
Homogénea (ISQCH),
CSIC. Universidad de
Zaragoza, Spain



Prof. Ángela Sastre
Universidad Miguel
Hernández, Elche
(Alicante), Spain



Prof. Beatriz Julian-López
Institute of Advanced
Materials (INAM)
Universitat Jaume I, Spain.

Program

- ✓ 15:00 / **Opening session to the symposium** - Prof. Raquel E. Galian - Instituto de Ciencia Molecular, Universitat de València, Spain.
- ✓ 15:05 -15:35 / **“Designing hypoxia-resilient photosensitisers: photoredox strategies for next-generation photodynamic therapy”** - Prof. Santi Nonell - IQS School of Engineering, University Ramon Llull, Barcelona, Spain.
- ✓ 15:35-16:05 / **“Metal Complexes as next-generation tools for Cancer Therapy”** - Prof. Concepción Gimeno - Instituto de Síntesis Química y Catálisis Homogénea (ISQCH), CSIC-Universidad de Zaragoza, Spain.
- ✓ 16:05-16:35 / **“Phthalocyanines and Perylenediimides as Outstanding Transporting Materials in Perovskite Solar Cells”**- Prof. Ángela Sastre Santos - Universidad Miguel Hernández, Elche (Alicante), Spain
- ✓ 16:35-17:00 *Coffee-break*
- ✓ 17:00-17:30 / **“Microwave-assisted synthesis of metal halide perovskites for photovoltaics and optoelectronics”**- Prof. Beatriz Julián-López .- Institute of Advanced Materials (INAM), Universitat Jaume I, Spain.
- ✓ 17:30- 17:40 | **“Unveiling the Optical Features and Outstanding Stability of a Novel Carbon-Based Nanomaterial”** - Alessandro Ciccone - Institute of Molecular Science, Universitat de València, Spain.
- ✓ 17:40-17:50 | **“Photocatalytic Activity of Lead-Free Perovskite inspired nanomaterials”**
Joel Monfort Rivero- Institute of Molecular Science, Universitat de València, Spain.
- ✓ 17:50-18:00 | **“Hydroxytrifluoromethylation of Alkenes by NIR organic photocatalysis**
Víctor Albiñana Martínez - Institute of Molecular Science, Universitat de València, Spain.
- ✓ 18:00-18:10 | **“Light-Activated Organic Synthesis Using Dye-Based Colloidal Nanoparticles Photocatalyst”**
Pablo Cárceles Román -Institute of Molecular Science, Universitat de València, Spain.



Prof. Santi Nonell

Biography

Santi Nonell is a ICREA Professor of Physical Chemistry at the IQS School of Engineering, (University Ramon Llull, Barcelona, Spain). He earned his Ph.D. for work carried out at the Max-Planck-Institut für Strahlenchemie (Silvia Braslavsky) and conducted postdoctoral research at the Arizona State University (Tom Moore) and the University of California Los Angeles (Chris Foote).

His core research interests lie in the area of physical and chemical photobiology, with a focus on singlet oxygen and the chemical and photochemical aspects of photodynamic therapy, a field to which he has contributed more than 200 papers and 31 PhD theses.

He served as President of the European Society of Photobiology, Editor-in-Chief of the journal *Photochemical & Photobiological Sciences*, and as Chair of the Spanish Network of Biological Photochemistry. He is currently the Director of the Photobiology School of the European Society for Photobiology.

His honours include the Otto Hahn Medal of the Max Planck Society, the election as a Fellow by the Royal Society of Chemistry, the Lifetime Achievement Award of the American Society for Photobiology and the ESP Award of Excellence in Photobiological Research of the European Society for Photobiology.

Designing hypoxia-resilient photosensitisers: photoredox strategies for next-generation photodynamic therapy

Abstract

Hypoxia severely limits photodynamic therapy (PDT) efficacy. We investigated photosensitisers that remain active under low oxygen, using spectroscopy, microscopy, and phototoxicity assays. Results reveal strong photoredox capacity and long-lived excited intermediates as key drivers of anticancer activity in hypoxic environments, offering design principles for next-generation PDT agents.



Prof. Concepción Gimeno

Biography

Prof. M. Concepción Gimeno graduated in Chemistry from the University of Zaragoza and completed her Ph.D. thesis under the supervision of Professors Rafael Usón and Antonio Laguna at the same University. She pursued a postdoctoral stay at the University of Bristol with Prof. Gordon Stone, focusing on the synthesis and reactivity of transition metal carbines. In 1990, she secured a position as Senior Scientist at the CSIC, Institute of Chemical Synthesis and Homogeneous Catalysis. Later, she was promoted to Scientific Researcher in 2000 and Research Professor in 2008. Her scientific interests involve the design, study, and analysis of new group 11 metal compounds with specific

catalytic, luminescent, and/or biological properties and potential applications. She has authored more than 300 scientific publications, including articles, reviews, and book chapters, and holds several patents, one licensed under exploitation. Her research has received over 11000 citations (*h*-index 49). Additionally, she serves as editor for the journals *Gold Bulletin* and *Sci. Rep.* and is a member of the Advisory Board of *Chemistry—A European Journal*. Prof. Gimeno has been honored with the "IUPAC 2017 Distinguished Women in Chemistry and Chemical Engineering," the "Excellence in Research of the Organometallic Chemistry Group (GEQO)" in 2017, the "Excellence in Research of the Spanish Royal Society of Chemistry (RSEQ)" in 2018, the Rafael Usón Medal (GEQO) in 2022, and became a Chemistry Europe Fellow in 2024, among other awards.

Metal Complexes as next-generation tools for Cancer Therapy

Abstract:

Biorganometallic chemistry provides therapeutic opportunities that go far beyond traditional organic drugs, driving the development of alternatives to cisplatin with reduced side effects and less susceptibility to resistance. In our group, we design bioactive mono- and heterometallic complexes through strategic ligand engineering to create multitarget anticancer agents, alongside bimetallic systems with potential as theranostic platforms or photodynamic therapy candidates.



Prof. Ángela Sastre

Biography

Ángela Sastre-Santos is currently Full Professor of Organic Chemistry at the Universidad Miguel Hernández de Elche (UMH, 2010). Head of the Instituto de Biongeniería since October 2018 till July 2024.

She graduated in Chemical Sciences (organic chemistry specialty) at the Autonomous University of Madrid (UAM) (June 1990), where he completed her doctoral thesis (June 1995), for which she obtained the extraordinary doctorate award. She then carried out several postdoctoral stays, 6 months at the *École Supérieure de Physique et Chimie Industrielles* (Paris, France), a year and a half at the Institute for Polymers and Organic Solids, University of California, Santa Barbara (USA) and 6 months at the Department of Chemistry and Biochemistry, University of California, Los Angeles (USA), working in both cases in the group of Prof. Fred Wudl and collaborating with the 2000 Nobel Prize in Chemistry, Alan Heeger; awarded for the discovery and development of conductive polymers. Next (March 1998), she returned to the UAM as a researcher hired by the Ministry of Education and Science thanks to the subprogram for the reincorporation of Doctors in SpaBin. In October 1998 she joined UMH as associate professor and in 2010 she was promoted to Full Professor. She currently directs a research group within the UMH Bioengineering Institute focused mainly on the synthesis of electroactive molecular and supramolecular systems with nano- and biotechnological applications.

She is member of the American Chemical Society, Electrochemical Society, Society of Porphyrins and Phthalocyanines, the Spanish Royal Chemical Society and the Spanish Royal Physical Society; within the two latter, she was the President of the Nanoscience and Molecular Material Division (March 2013-May 2021). She has published more than 180 peer-reviewed articles, 5 national patents and 2 book chapters, $h = 43$. Awarded by the José Barluenga 2018 Medal of the Specialized Group of Organic Chemistry of the Royal Spanish Society of Chemistry, in recognition of a projection of quality and excellence in her independent research career in Organic Chemistry. Co-founder of the spin-off Anfechem S.L.

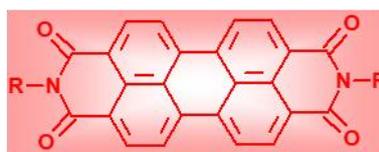
Phthalocyanines and Perylenediimides as Outstanding Transporting Materials in Perovskite Solar Cells

Abstract:

Recently, significant progresses have been achieved in the fabrication of highly efficient perovskite solar cells (PSCs), while major challenges, such as commercial viability of exotic materials and their instability, remain as an obstacle. Hole transporting materials (HTMs) and electron transporting materials (ETMs) represent a tricky choice for the fabrication of efficient solar cells. On the other hand, self-assembled monolayers SAMs have recently emerged as promising alternatives to conventional charge-selective contacts in photovoltaic applications. They can chemically anchor to the surfaces of transparent conductive oxides, spontaneously creating ultrathin layers of few nanometers thick. Moreover, the meticulously designed functional groups that interact with the perovskite layer allow for precise control over interface characteristics, potentially enhancing device performance by improving the crystallinity of the perovskite layer and strengthening charge selectivity.

Semiconductors molecules, such as metallophthalocyanines (MPcs) and perylenediimides (PDIs) appeared as a promising class of p-type and n-type materials in PSCs since they are easy to synthesize, cheap, stable and also are good candidates to form stable SAMs.

In this seminar, I will present the use of MPcs and PDIs as efficient, stable, and low-cost transporting materials in PSCs in a n-i-p and p-i-n configuration.



Prof. Beatriz Julián-López

Biography

Beatriz Julián-López is an Associate Professor at the University Jaume I (UJI) and leader of the “*Photoactive Materials for Energy*” group at Institute of Advanced Materials (INAM), specializing in the design and synthesis of advanced optical functional materials, including metal-oxide nanostructures and hybrid organic–inorganic nanocomposites, with internationally recognized expertise in soft-chemistry and self-assembly approaches. Her work focuses on creating cost-efficient, high-performance luminescent materials for applications in photonics, lighting, energy, ceramics, catalysis, and security, supported by a strong publication record (>70 papers, >4700 citations, *h*-index 28) and leadership roles such as President of the International Sol-Gel Society (ISGS). She has led or participated in numerous competitive research projects at regional, national, and European levels, contributed extensively to international conferences, and engaged in technology transfer through collaborations with ceramic and ink-jet industries. Additionally, she plays an active role in academic service and STEM-education initiatives, including Erasmus+ programs and the NANOMER capacity-building project on pedagogical innovation in nanoscience.

Microwave-assisted synthesis of metal halide perovskites for photovoltaics and optoelectronics

Abstract

Metal halide perovskite nanocrystals (PeNCs) possess exceptional optoelectronic properties, such as narrow emission, tunable band gaps, and high photoluminescence quantum yields, making them highly suitable for applications in photovoltaics (solar cells), lighting (LEDs), photodetectors, and lasers. However, scalable and cost-effective production remains challenging. Conventional methods like hot-injection require complex setups and high temperatures, hindering industrial adoption. In contrast, microwave (MW)-assisted synthesis enables selective heating, shorter reaction times, and improved efficiency, offering a promising alternative.

This presentation will highlight our group’s recent achievements in MW-mediated synthesis of both Pb-based and Pb-free perovskites. We will discuss the fabrication of different active materials such as CsPbX₃ (X: Cl, Br, I) nanocrystals (**Figure 1**) and Pb-free Cs₂(Ti/Sn)Br₆ double perovskite systems. Emphasis will be placed on how key parameters affect the nucleation and growth of materials, but also on their performance in real devices. The advantages and limitations of this strategy will be examined, underscoring MW synthesis as a scalable and sustainable route for next-generation perovskite semiconductors in energy conversion.

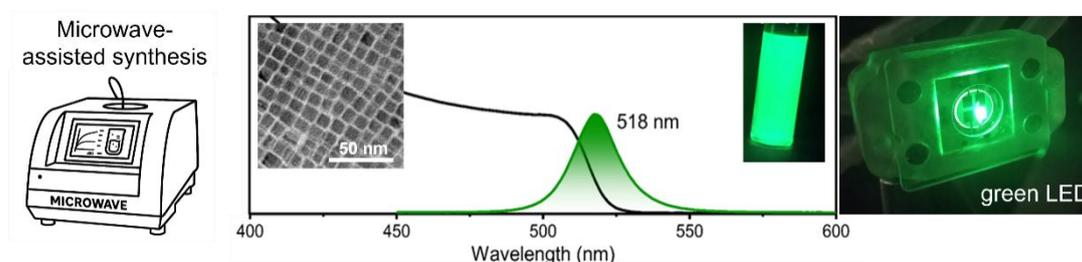


Figure 1. Figures of merit for CsPbBr₃ nanocrystals synthesized by a microwave-assisted route