#ICMolTalks

José Luis Mascareñas

Centro Singular de Investigación en Química Biolóxica e Materiais Moleculares (CiQUS).
Santiago de Compostela, Spain.

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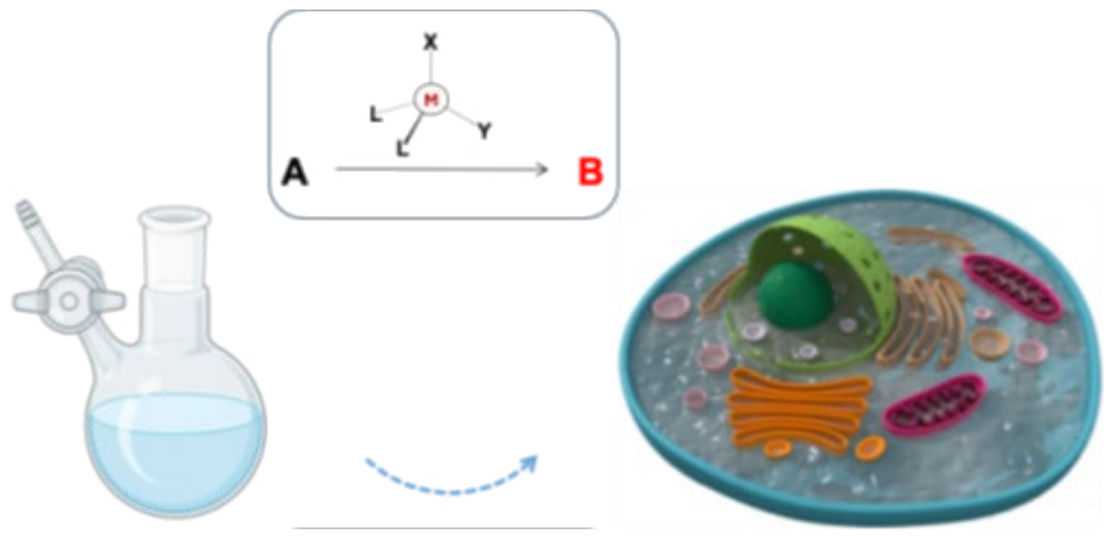
Assemby Hall - ICMol

Abstract

Transition metal catalysis: from flasks to live cells

Transition metal complexes have proven invaluable across a broad spectrum of scientific disciplines, including catalysis, synthesis, photophysics, and supramolecular chemistry. Their diverse coordination geometries and redox properties, combined with the ability to fine-tune these characteristics through ligand modification, offer extensive opportunities for developing novel reactivities and tailored physicochemical responses.
Building on these unique features, our research has focused on leveraging transition metal complexes in catalysis, synthesis, and chemical biology. In recent years, we have explored the feasibility of adapting organometallic catalysis to function in biological environments, including within living mammalian cells. This endeavour poses significant challenges, particularly due to the sensitivity of many metal-catalyzed reactions to air and water, as well as the stringent demands for orthogonality and biocompatibility. Nonetheless, we have successfully developed several intracellular reactions promoted by palladium, ruthenium, and gold complexes. Recently, we are also exploring the development of photocatalytic synthetic processes in livings settings.



References
[1] For reviews, see: (a) D. Fernández, J. L. Mascareñas, F. López, Chem. Soc. Rev. 2020, 49, 7378. (b) M. Font, M. Gulías, J.L. Mascareñas, Angew. Chem. Int. Ed. 2023, 61, e202112848
[2] (a) C. Vidal, M. Tomás-Gamasa, P. Destito, F. López, J.L. Mascareñas, Nature Commun. 2018, 9, 1913. (b) S. Gutierrez, M. Tomas-Gamasa, J.L. Mascareñas, Angew. Chem. Int. Ed. 2021, 60, 22017. (c) J. Miguel-Avila, M. Tomás-Gamasa, J.L. Mascareñas, Trends in Chem. 2023, 10.1016/j.trechm.2023.04.001. (d) M. Mato, X. Fernández-González, C. D'Avino, M. Tomás-Gamasa, J.L. Mascareñas, Angew. Chem. Int. Ed. 2024, 63 e202413506

Biography

José Luis Mascareñas is full Professor in Chemistry at the University of Santiago de Compostela (USC, Galicia, Spain) since 2005, and has been the scientific director of the Center for research in biological chemistry and molecular materials (CiQUS) since february 2014 until april 2025. He completed his PhD at the University of Santiago and carried out postdoctoral studies in Stanford University (USA, 1989-1991). He has been visiting scholar in Harvard University (USA) in the summers of 1992 and 1995, and visiting scientist in the University of Cambridge (UK, 2009) and the MIT (USA, 2013).
He has supervised 48 PhD theses, published more than 250 articles in peer reviewed journals and wrote 23 patent applications.
Some awards and honors: Organic Chemistry award of the Spanish Royal Society of Chemistry (RSEQ, 2009), Advanced grant of the ERC (2014), Galician of the year "Grupo Correo Gallego" (2014), Gold medal of the University of Santiago (2014), Gold Medal of the Spanish Royal Society of Chemistry (2015), award of the Galicia Critic (2018), Research Medal of the Royal Galician Academy of Sciences (2019), Proof-of-Concept grant of the ERC (2020), member of the European Academy of sciences (EURASC, since 2017), founder/first president of the Spanish group of Chemical Biology of the RSEQ and, since 2021, vicepresident of the RSEQ. He has been appointed as member of the Spanish Royal Academy of Sciences in march 2025, and the President of the prestigious Bürgenstock conference in 2025. He has been recently awarded with a EIC transition grant for the preclinical development of a new type of anticancer agents, and received the Rey Jaume I award for basic research in Spain in June 2025. His current research interests split into two programs: the discovery of unconventional metal-catalyzed processes, and the development of abiotic catalysis within living systems. *http://www.metbiocat.eu/members*