

#ICMoITalks

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Clip-off Chemistry: Synthesis by Bond Cleavage

Abstract

Historically, innovations in synthetic methods and reactions have changed the way scientists think about designing and synthesizing materials and molecules. Indeed, novel synthetic methods not only unlock access to previously unattainable structures, but also inspire new concepts as to how we design and build materials to address global social, economic and industrial needs. In this talk, I will present the concept of bond breaking as a new synthetic methodology that we have named Clip-off Chemistry. Unlike most state-of-the-art synthetic approaches, which use bottom-up strategies to link atoms and molecules through the formation of new bonds, Clip-off Chemistry is based instead on the selective cleavage of existing bonds in molecules and materials, providing precise spatial control over bond cleavage. Therefore, Clip-off Chemistry represents a new synthetic methodology, whereby the programmed selective disassembly affords new molecules and materials. This disassembly occurs at the molecular level through a chemical reaction; in a first approach, through ozonolysis, a gas/solid reaction that enables cutting of constituent organic molecular building blocks or linkers via direct cleavage of their alkene bonds. In this talk, I will show the principles of Clip-off Chemistry and the first examples of structures and molecules synthesized through controlled bond fission in reticular materials (ie. MOFs and cages).

Biography

Dr. Daniel MasPOCH is an ICREA Research Professor and Leader of the Supramolecular NanoChemistry & Materials Group at ICN2 and UAB. He is a chemist who has always maintained a rewarding balance between fundamental and applied research, with pioneering developments in the field of porous metal-organic frameworks and delivery systems. He is author of over 200 articles. In 2021 and 2022, he got the prestigious ERC Advanced Grant and a second ERC Proof-of-Concept Grant, respectively. In addition, he was awarded an ERC Consolidator Grant in 2014, and his first ERC Proof-of-Concept Grant in 2019. In 2015, he was awarded the Premio Marcial Moreno Mañas Lectureship, in 2020 he was rewarded with the Research Excellence Award from the Spanish Royal Society of Chemistry, and in 2022 he was appointed new Corresponding Academician of the Physical and Chemical Sciences Section, in the specialty of Materials Science by the Royal Spanish Academy of Science (RAC). Finally, in 2023, he was awarded the Rei Jaume I Award in New Technologies.

From the technology transfer side, several technologies and materials developed by his group have been transferred –through licensing patents or signing technology transfer contracts– to various companies. More specifically, Daniel has signed more than 23 research contracts with private companies and has filed 12 patents, from which 4 have been licensed. Interestingly, these technologies have given rise to families of products that are now on the market, as for example LuctaCaps® and Fungipol@CP. He is also co-founder of the spin-off company Ahead Therapeutics.