#ICMolTalks

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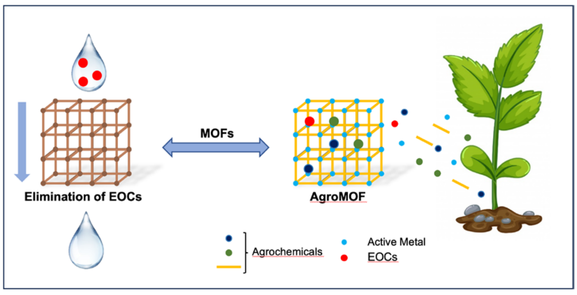
DIFFERENT ROLES OF METAL-ORGANIC FRAMEWORKS IN ENVIRONMENTAL APPLICATIONS

Abstract

Agrochemicals have become a fundamental part of today's agricultural systems to fulfill the huge demand of food. However, their excessive usage is deteriorating the quality of ecosystems, even affecting human health. Large proportion of applied agrochemicals (10-75%) do not reach their target, and their frequent use results in the contamination of surface and groundwater, even reaching drinking water. This is particularly important since a large proportion of the world's population is currently experiencing water stress, and there is a rising global drinking water demand. Among a wide different array of compounds (pharmaceuticals and personal care products, industrial compounds/byproducts, food additives) agrochemicals in water are considered as Emerging Organic Contaminants (EOCs). The term used not only cover already known contaminant species, but also newly developed compounds with novel negative effects for the environment and human health. Despite several strategies have been proposed for the EOCs exclusion, the insufficient EOCs removal of these processes makes necessary to search new efficient alternatives.

Recently, Metal-Organic Frameworks (MOFs) appeared as innovative and promising materials for environmental applications. MOFs have several features (high sorption capacities, the possibility of using healthy friendly constituents, optimal degradability as they can remain stable enough to carry out their functions, can be synthetized at large scale, etc.) that make them excellent candidates for environmental applications.[1] In this regard, MOFs can be used in water treatment or in the controlled release of agrochemicals. Here, we are investigating the application of MOFs in the elimination (adsorption & photodegradation) of challenging EOCs from real wastewater from a treatment plant; or the use of agrochemicals as building blocks of MOFs (AgroMOFs) to achieve a controlled their delivery and enhance crop production and quality, while reducing contamination.[2] All these studies evidenced the potential of MOFs in the reduction of environmental contamination, envisioning their future real application.



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References

[1] S. Rojas, A. Rodríguez-Diéguez, P. Horcajada. ACS Appl. Mater. Interfaces 2022, 14, 16983-17007.

[2] B. Sierra-Serrano, A. García-García, et al. ACS Appl. Mater. Interfaces 2022, 14, 34955-34962.

Biography

Dr. Sara Rojas Macías is a Ramon y Cajal researcher at the University of Granada (UGR). She obtained her PhD in 2014 focused on the preparation of novel metal-organic frameworks (MOFs) and their use as drug delivery systems. In 2016, she obtained the prestigious grant Marie Sklodowska Curie Individual Fellow to develop porous materials for the treatment of intoxications at the Institute Lavoisier in Versailles (France) under the supervision of Dr. Nathalie Guillou.

In 2018, she obtained the Atracción del Talento grant awarded from the Comunidad de Madrid to develop her investigation in the research group of Dr. Patricia Horcajada in the IMDEA Energy Institute (Madrid).

In 2020 she was awarded with a Juan de la Cierva Incorporación Fellowship to join the UGR, and recently with a Ramón y Cajal Fellow (2022). In the UGR, she is co-leading a research group devoted to the development of new MOF hybrid materials and composites and their uses in biomedical, environmental and energy related fields.

Dr. Rojas Macías has received several distinctions such as the Best research article published in 2018 by the Spanish Association of Bioinorganics (AEBIN) and the RSEQ Young Researcher Award (2022).