

MeMo3D: Membranes Decorated With Self-Assembling 3D Metal Organic Frameworks - From Design to Selective Purification of Water Bodies

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The vulnerability of water bodies to human activities leads to a widespread problem of degradation of these environments and denounces the finitude of potable water in many regions of the Earth. Among this area, pollution by pharmaceuticals stands out - irremovable by most filtration processes and with increasingly greater impacts on river courses - and dyes, which, used en masse by the textile industry and often discarded without adequate treatment, produce changes on the aesthetics of water bodies and have massive impacts on aquatic ecosystems. The present project aims to use metal-organic frameworks (MOF) as a low-cost solution for purifying contaminated water. The use of a polymeric matrix synthesized from MIL-100(Fe) was established as an adsorbent for dyes and drugs present in the water environment, overcoming the challenges inherent to the costs of synthesizing MOFs and enhancing their application in the public environment. The synthesis of the component constituted a methodological innovation, based on an analysis of the selectivity in adsorption and its link with the time and temperature of synthesis. Through physical-chemical characterization and laboratory tests, the high performance in the adsorption and filtration of heavy contaminants, the photocatalytic potential of the membrane and its adaptability to the most diverse use situations were verified, starting from a low production cost and high degrees of environmental preservation - enabling the establishment of a sustainable society based on environmental quality.

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