

European metal-organic framework network: combining research and development to promote technological solutions (EU4MOFs)

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The constantly growing world population and current European energetic crisis demand innovative scientific and technological solutions. The crystalline hybrid material class of Metal-Organic Frameworks (MOFs) holds potential to help address societal challenges like health, water and sustainable energy due to their unprecedented high degree of porosity, chemical and structural versatility, and functional tunability. However, the translation of groundbreaking basic research into development of potential MOF-based technologies is still hampered by the lack of precise control over their structure, properties and performance from the molecular-level framework to the nano-, meso- and macro-scale dimension material for each application. This COST Action (EU4MOFs) aims at increasing control and customization over the interplay between (re)activity, selectivity, efficiency and processability of MOF materials to ensure optimal functional properties at these three length scales. EU4MOFs will focus on paving the way towards the development of nano-, meso- and macro-scale high-performing MOF materials for three high-need applications: (cancer) nanomedicine, wastewater treatment and energy storage. To achieve this, manufacturing technologies based on bottom-up synthesis and top-down engineering strategies will be consolidated, and high-throughput computational screening and machine learning methods will be integrated to improve structure-property predictions and the resulting materials performance. By uniting interdisciplinary researches from the fields of (bio)chemistry, materials engineering, physics, nanomedicine, pharmacy, and computational science, together with industrial partners, EU4MOFs will contribute to substantially advance the current frontiers of MOF materials from the laboratory bench towards industrial-scale, in order to ultimately generate societal impact.

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