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Metal Organic Framework (MOF)-Based Micro/Nanoscale Materials

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The field of Metal–Organic Frameworks (MOFs) has reached a historic milestone, validated by the 2025 Nobel Prize in Chemistry in recognition of their transformative power. Celebrating this moment, this Special Issue showcases cutting-edge advances in MOF-based micro/nanoscale materials, highlighting their unparalleled structural tunability, exceptional surface areas, and versatile functionalities across energy storage, catalysis, environmental remediation, and drug delivery. The collected contributions explore fundamental stability enhancements in basic environments, complex water sorption mechanisms, and computational approaches, including machine learning for material screening. The featured innovative applications include transition metal oxides on carbon fibers for energy storage, Au nanoparticles encapsulated in Ce-MOFs, achieving record-breaking TOFs for glycerol carbonate synthesis, and sensitive detection platforms for acetone, VOCs, and Hg²⁺. Additional studies demonstrate electromagnetic wave dissipation through vacancy-engineered composites and pH-responsive drug delivery systems using ZIF-8 nanocarriers. Together, this collection captures the vibrant interdisciplinary frontier of MOF research, from foundational property investigations to groundbreaking functional applications with immense practical potential.

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