Design and Characterization of Rare Earth Metal-Based Zwitterionic Metal-Organic Frameworks

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Metal-Organic Frameworks (MOFs) are a class of crystalline porous materials composed of metal clusters or ions and organic linkers to form multi-dimensional frameworks. Their high surface area and large pore volume combined with their tunable nature make them ideal candidates for potential applications such as gas storage, small molecule separation and sensing. Zwitterionic (ZW) ligands when utilized in MOFs induce an electrostatic field gradient on their surfaces due to their well-separated charges. Thus, their incorporation into MOFs can create organic charged surfaces which lead to polarization effects on guest molecules, improving host-guest interaction. The objective of this project is to design and characterize new rare earth metal-based ZW-MOFs from rigid pyridinium-based ZW ligands. In this presentation we focus on the MOF's interesting coordination, electronic, and optical properties. These properties in combination with their porous nature deem microporous rare earth MOFs (RE-MOFs) significant for various applications such as gas adsorption, photoluminescence, chemical sensing, and heterogeneous catalysis.

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