

Post-synthetic modification of a 2D water-stable Zn-MOF; from exfoliated nanosheets to the formation of 3D supramolecular structure functionalized by acid/base groups

Qasem Maleki, Valiollah Nobakht* and Sepideh Samiee

Department of Chemistry, Faculty of Science, Shahid Chamran University of Ahvaz, Ahvaz, Iran

**E-mail: v.nobakht@scu.ac.ir*

Post-synthesis modification (PSM) is known as a powerful approach that provides the opportunity for the design of new frameworks. The current research reports the PSM of a 2D Zn-MOF in three steps. By removing the coordinated solvent molecules from the 2D structure of Zn-MOF, as pristine structure, Zn-MOF-df with the coordinatively unsaturated site (CUS) as Lewis acid site was prepared in the first step. Then, the 2D packing structure of the Zn-MOF-df was exfoliated to form Zn-MOF-df-ex sheets. At step two, ethylenediamine (en) and 1,3-diamino propane (dap) molecules as amine functional groups were separately added to Zn-MOF-df to obtain Zn-MOF-en and Zn-MOF-dap, respectively. A multi-layer structure was recommended for the Zn-MOF-en, where some of the en molecules act as a cross-linking agent to connect a number of Zn-MOF-df layers to each other, while terminal amine groups acts as Lewis base sites (fig.1). Concerning the Zn-MOF-dap, the dap molecules cross-linked all the layers in the crystal packing and form a 3D supramolecular framework. In the third step of tandem PSM, Zn-MOF-en-ps containing Brønsted acid was synthesized by adding 1,3-Propane sultone (ps) molecules to Zn-MOF-en. Finally, it is believed that through the PSM strategy, it is possible to prepare various MOFs with outstanding properties for designed applications [1-4].

Keywords: Post-synthetic modification, Functionalization, Metal-organic framework

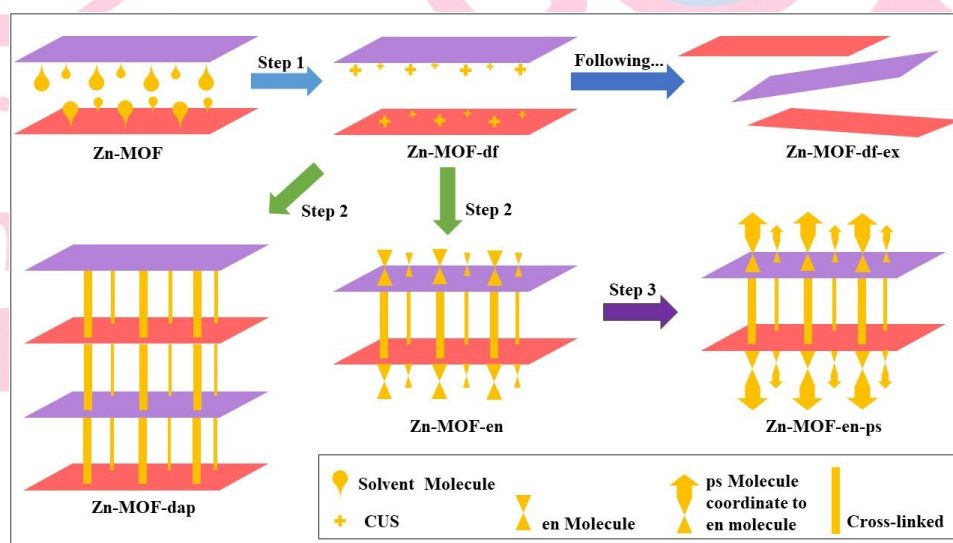


Fig. 1. Tandem post-synthetic modification on 2D Zn-MOF

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