Supporting Information

Liquid-Phase Catalytic Oxidation of Limonene to Carvone over ZIF-67(Co)

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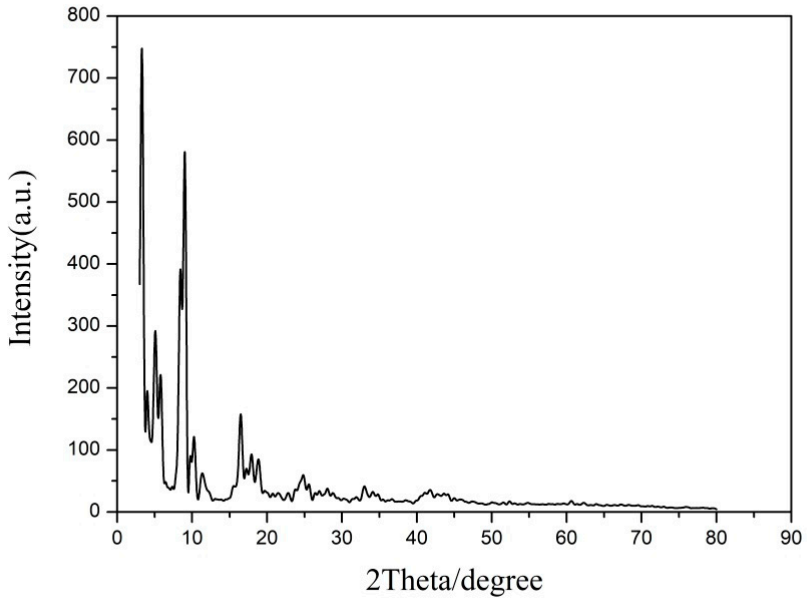
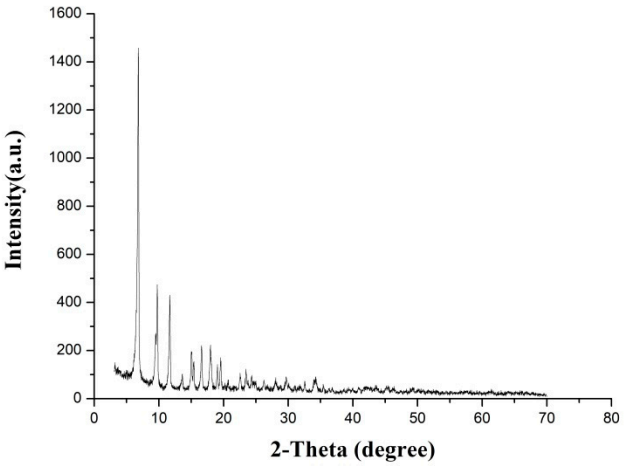
Supplementary 1. The synthesis of other MOFs

a. The synthesis of MIL-101(Cr): A certain amount of terephthalic acid was dissolved in 30 mL water and added with $Cr(NO_3)_3 \cdot 9H_2O$. Ultrasound was applied for half an hour and pushed it into the reactor. Materials were placed in an oven and reacted at 210 ℃ for 6 hours. Then, materials were taken out and drained to obtain a green solid after cooling down to room temperature. It was purified by centrifugation with added DMF. Finally, the solid was put into the oven for drying and a green powder was obtained.



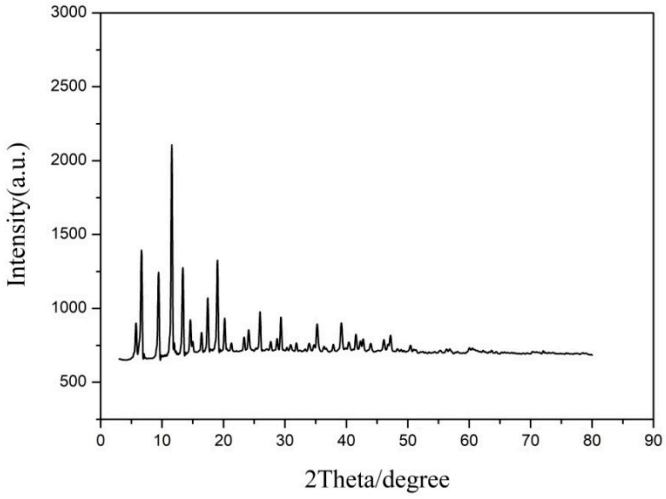
Supplementary Figure 1. XRD patterns of MIL-101(Cr)

b. The synthesis of MIL-125(Ti): Certain quantities of DMF and methanol were added to a reaction kettle, and then Titanium tetraisopropoxide (TTIP, 97%, Sigma-Aldrich, St. Louis, MO, USA) and terephthalic acids were added to this reaction kettle. The mixture was put into a reactor after ultrasonic treatment for 0.5 h, and placed in an oven at 150 ℃ for 16 h. The mixture was filtered and washed twice with DMF and methanol respectively after cooling down to room temperature. Finally, the powders were put in vacuum at 150 ℃ for 12 hours.



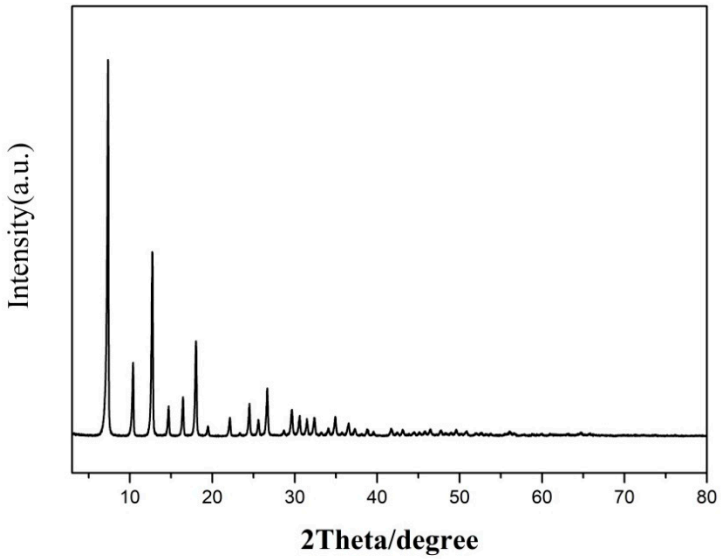
Supplementary Figure 2. XRD patterns of MIL-125(Ti)

c. The synthesis of HKUST-1(Cu): 25 mL absolute ethanol was stirred to dissolve in pyromellitic acid and transferred to the reactor. Then, $Cu(NO_3)_2 \bullet H_2O$ and 25 mL distilled water were added to a 50 mL beaker. Ultrasound was used to dissolve it completely and solution **1** was obtained. Solution **1** was slowly added to the reaction kettle with continuous stirring until a gelatinous material was formed. Then, 25 mL DMF was added slowly to the reactor to obtain a clear and transparent blue solution. The solution was stirred continuously until a solid precipitate formed. The precipitated solids were filtered and washed three times by adding anhydrous ethanol. Finally, the solid was filtered and dried for half an hour at 70 ℃ to obtain a blue powder.



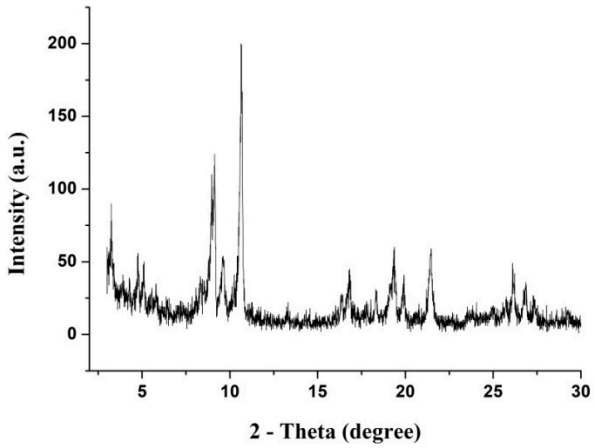
Supplementary Figure 3. XRD patterns of HKUST-1(Cu)

d. The synthesis of ZIF-8(Zn): Methanol and ammonia at a volume ratio of 1:5 were mixed in a glass beaker, and then 2-methylimidazole and $Zn(OH)_2$ were added. The mixture was treated with ultrasound and placed at room temperature for two days. A white powder solid was obtained by filtration, washing, and drying.



Supplementary Figure 4. XRD patterns of ZIF-8(Zn).

e. The synthesis of MIL-101(Fe): $FeCl_3 \bullet 6H_2O$ and terephthalic acid were added to the reactor, and then 15 mL DMF was added to stir for 60 min. This mixture was transferred into a 110 ℃ oven and reacted for 20 h at constant temperature. Obtained material was dried and washed with DMF after cooling down to room temperature. Then, 30 mL of absolute ethanol was added and shocked at 60 ℃ for 3 h. Finally, it was filtered, washed, and dried at 70 ℃ to obtain a brick-red solid.



Supplementary Figure 5. XRD patterns of MIL-101(Fe).