Electronic Supplementary Information (ESI)

Alternative synthetic approaches for metal–organic frameworks: transformation from solid matters

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Table S1 Summary of solid matters used for MOF syntheses.

Solid matter	Organic ligand	Reaction temperature	Reaction time	Solvent	Ref.
ZnO	2-methylimidazole	100°C	24 h	solvent-free	1
ZnO	2-methylimidazole	100°C	30 min	solid-vapor reaction	2
Al_2O_3	1,4-naphthalenedicarboxylic acid	180°C	1 to 10 min	water	3
Al_2O_3	4,4',4",4"'-(porphyrin-5,10,15,20-tetrayl)tetrabenzoic acid (H_4TCPP)	140°C	10 min	DMF/H_2O	4,5
Bi_2O_3	salicylic acid	room temperature (slight increase due to friction by ball milling)	10 to 60 min	solvent-free	6
Cu_2O	benzene-1,3,5-tricarboxylic acid	room temperature	several hours	water, ethanol, DMF	7-9
CuO	benzene-1,3,5-tricarboxylic acid	room temperature	1 h	ethanol/water mixture	10

V_2O_5	1,4-naphthalenedicarboxylic acid	180°C	1 s to 1 h	water	[11]
ZnO	2-methylimidazole	100–160°C	varied depending on the conditions	solvent-free,[12] or ethanol/octanol,[13] or DMF/H_2O [14]	[12-14]
ZnO	benzimidazole	50°C	30 min under microwave radiation	water/DMF mixture	[14]
ZnO	fumaric acid and 4,4'-dipyridyl or trans-1,2-bis(4-pyridyl)-ethylene	< 33°C	30 min	liquid-assisted grinding	[15]
MgO, MnO, CoO, NiO, or ZnO	H_4(dobpdc), dobpdc = 4,4'-dioxido-3,3'-biphenyldicarboxylate	120 °C	10 min to 20 h	DMF	[16]
ZnO supported film	2-methylimidazole	room temperature	48 h	methanol	[17]
CoO or ZnO	2-methylimidazole	45°C, humid air	2 to 4 days; 15 days (without salt additive)	solvent free	[18]
MgO, MnO, CoO, NiO, ZnO, CdO, PbO	oxalic acid	45°C or room temperature	days	high humidity	[19]
Cu_2O, Fe_3O_4	cyanometallate ions	40°C	30 min	water	[20]
$Zn(OH)_2$	3-(3-methyl-2-pyridyl)-5-(4-pyridyl)-1,2,4-triazole	300°C	16 h	solvent-free	[1]
$Zn(OH)_2$	2-methylimidazole (for preparation of ZIF-8), benzenedicarboxylic acid (for MOF-5)	room temperature, or 100°C	24 h	ethanol/water	[21]
$Zn(OH)_2$	2-methylimidazole	30°C	6 h	ethanol/water	[22]
$Mg(OH)_2$/ or MgO	3-(3-methyl-2-pyridyl)-5-(4-pyridyl)-1,2,4-triazole	300°C	16 h	solvent-free	[1]
$Co(OH)_2$/CoO	imidazole or 2-methylimidazole	100°C or 160°C	48 h	solvent-free	[12]
ZnO and $Ni(OH)_2$	adenine and monocarboxylic acids	160°C	6 to 60 min	solvent free	[23]

$Co(CO_3)_{0.5}(OH)$	2-methylimidazole	room temperature	24 h	water	[24]
rare-earth(III) carbonates	benzene-1,3,5-tricarboxylic acid	ball-milling, temperature was not controlled	20 min	liquid-assisted grinding	[25]
rare earth sesquioxides	benzene-1,3,5-tricarboxylic acid	20°C	hours or days	solvent vapors or moisture	[26]
$Cu_2(OH)_3NO_3$	benzene-1,3,5-tricarboxylic acid	room temperature	10 min	ethanol	[27]
zinc slice	benzene-1,3,5-tricarboxylic acid	140°C	24 h	water	[28]
$Cu(OH)_2$ #	benzene-1,3,5-tricarboxylic acid	room temperature	5 min to 5 h	H_2O / ethanol mixture	[29-32]
$Cu(OH)_2$	benzene-1,3,5-tricarboxylic acid	nil	continuous process	solvent-assisted extrusion	[33]
$Zn(OH)_2$	1, 4-benzenedicarboxylic acid	room temperature	1 h	DMF	[32]
$[Zn_2(CO_2)_2]\cdot[Zn_3(OH)_6]$	2-methylimidazole	150 to 200°C	continuous process	solvent-free	[33]
$Cu(OH)_2$	H_2bdc, bpy (bdc^{2-} = 1,4-benzenedicarboxylate; bpy=4,4'-bipyridine)	60°C	7 days	methanol	[34]
Al_2O_3, $Al(OH)_3$, and AlO(OH)	1,4-benzenedicarboxylic acid	200°C	72 h	water	[35]
$CaCO_3$	2,5-dihydroxybenzoquinone	room temperature	12 h	water	[36]
Cu substrate	benzene-1,3,5-tricarboxylic acid	n.a.	n.a.	benzyl alcohol, DMF	[37,38]
Cu nanoparticles	2,5-dihydroxyterephthalic acid	60°C	0 to 12 h	ethanol, DMF	[39]
Pt–Ni alloy	2,5-dihydroxyterephthalic acid	110°C	12 h	DMF	[40]
$Cu_2(OH)_3(OAc)$	potassium or sodium hexacyanoferrate (II or III)	room temperature	15 h	water	[41]
porous anodic aluminum oxide (AAO)	benzene-1,3,5-tricarboxylic acid	120°C	24 h	water, with the aid of metal hydroxide	[42]
$ZnSnO_3$	2-methylimidazole	180°C	12 h	solvent-free	[43]

Cu_2O@Au	benzene-1,3,5-tricarboxylic acid	room temperature or 50°C	40 min	ethanol and N,N-dimethyl acetamide (DMA)	[44]

Notes: Usually, the room temperature represents that the reactions were conducted without a particular means of temperature control.

[#] $Cu(OH)_2$ was obtained from the copper plates treated with NaOH solution.

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