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Self-Supporting Metal-Organic Layers as Single-Site Solid Catalysts
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Category

Polymer-Supported Synthesis

Key words

metal–organic layers

heterogeneous catalysis

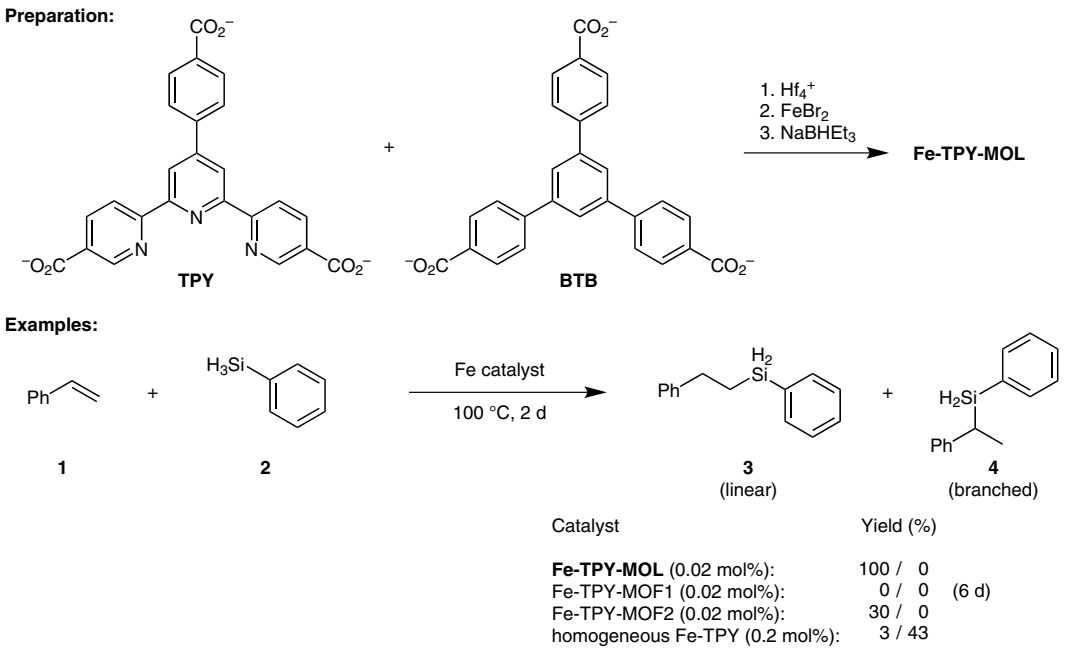
hafnium

iron

hydrosilylation

alkenes

Hydrosilylations Catalyzed by Iron-Doped Metal–Organic Layers



Catalyst	Yield (%)	
Fe-TPY-MOL (0.02 mol%):	100 / 0	
Fe-TPY-MOF1 (0.02 mol%):	0 / 0	(6 d)
Fe-TPY-MOF2 (0.02 mol%):	30 / 0	
homogeneous Fe-TPY (0.2 mol%):	3 / 43	

Significance: Metal–organic layers (MOLs) composed of $[Hf_6O_4(OH)_4(HCO_2)_6]$ secondary building units and 4,4′,4″-benzene-1,3,5-triyltribenzoate (BTB) bridging ligands were prepared. The MOL structures were doped with 4′-(4-carboxylatophenyl)-2,2′:6′,2″-terpyridine-5,5″-dicarboxylate (TPY) and $FeBr_2$ to afford the solid material Fe-TPY-MOL, which catalyzed the hydrosilylation of terminal olefins. For example, the reaction of styrene (**1**) with phenylsilane (**2**) proceeded in the presence of Fe-TPY-MOL to give the linear silane **3** in quantitative yield.

Comment: In the reaction of styrene (**1**) with phenylsilane (**2**), the Fe-TPY-MOL catalyst showed a better performance than the metal–organic framework-based catalysts Fe-TPY-MOF1 (prepared from an interlocked Hf-MOF instead of the MOLs), Fe-TPY-MOF2 (prepared from a stacked Hf-MOF instead of the MOLs), or the homogeneous counterpart Fe-TPY (prepared from $FeBr_2$, TPY, and $NaBHEt_3$). When Fe-TPY-MOF1, Fe-TPY-MOF2, and Fe-TPY were employed as catalysts for the reaction, the ratios of products **3** and **4** were 0:0, 30:0, and 3:43, respectively.

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