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


Hydrosilylations Catalyzed by Iron-Doped Metal–Organic Layers

**Significance:** Metal–organic layers (MOLs) composed of [Hf₆O₄(OH)₄(HCO₂)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 FeBr₂ 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 FeBr₂, TPY, and NaBHEt₃). 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.

**Examples:**

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Preparation:

TPY + BTB → Fe-TPY-MOL

Examples:

Ph₂=CH₂ + H₃SiPh → Fe catalyst → Ph₃SiPh (3) + Ph₃SiPh (4)
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**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

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Synfacts 2016, 12(07), 0751 Published online: 17.06.2016 DOI: 10.1055/s-0035-1562272; Reg-No.: Y07216SF