

Palladium Nanoparticles Incorporated within Sulfonic Acid-Functionalized MIL-101(Cr) for Efficient Catalytic Conversion of Vanillin

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Supporting Information

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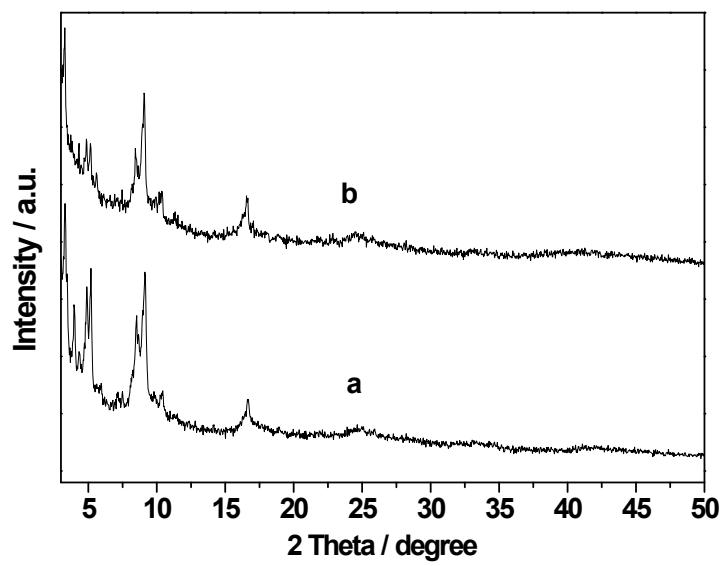


Fig. S1. Wide-angle XRD patterns of $\text{SO}_3\text{H}-\text{MIL}-101(\text{Cr})$ (a), and 2.0 wt.% Pd/ $\text{SO}_3\text{H}-\text{MIL}-101(\text{Cr})$ (b).

Table S1 Textural properties of various catalysts

Catalyst	S_{BET} $\text{m}^2 \text{ g}^{-1}$	V_{total} $\text{cm}^3 \text{ g}^{-1}$
$\text{SO}_3\text{H}-\text{MIL}-101(\text{Cr})$	1754	0.91
2.0 wt.% Pd/ $\text{SO}_3\text{H}-\text{MIL}-101(\text{Cr})$	820.3	0.60
2.0 wt.% Pd/MIL-101(Cr)	2596	1.35
2.0 wt.% Pd/C	1245	0.81
Spent Catalyst 2.0 wt.% Pd/ $\text{SO}_3\text{H}-\text{MIL}-101(\text{Cr})$	798.7	0.59

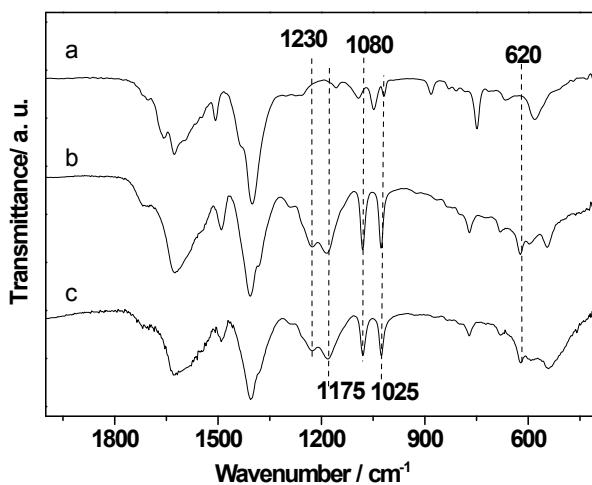


Fig. S2. FT-IR spectra of the synthesized MIL-101(Cr) (a), SO₃H-MIL-101(Cr) (b), and 2.0 wt.% Pd/SO₃H-MIL-101(Cr) (c)

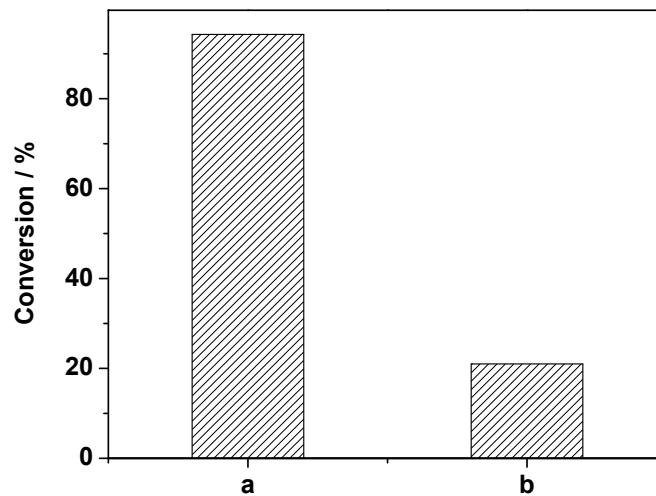


Fig. S3. Hydrogenolysis of vanillin alcohol over 2.0 wt.% Pd/SO₃H-MIL-101(Cr) in the absence (a) and in the presence of pyridine (b). (Reaction conditions: vanillin alcohol, 2 mmol; water, 20 ml; amount of catalyst, 50 mg; S/C = 200; reaction temperature, 80 °C; reaction time, 180 min; the amount of pyridine was 0.02 g when used).

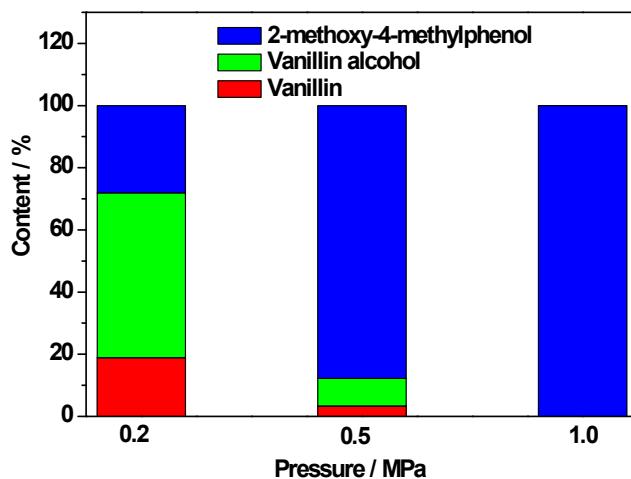


Fig. S4. Effect of hydrogen pressure on the conversion of vanillin over 2.0 wt.% Pd/SO₃H-MIL-101(Cr) (Reaction conditions: vanillin, 2 mmol; water, 20 ml; amount of catalyst, 50 mg; S/C = 200; reaction temperature, 100 °C; reaction time, 60 min).

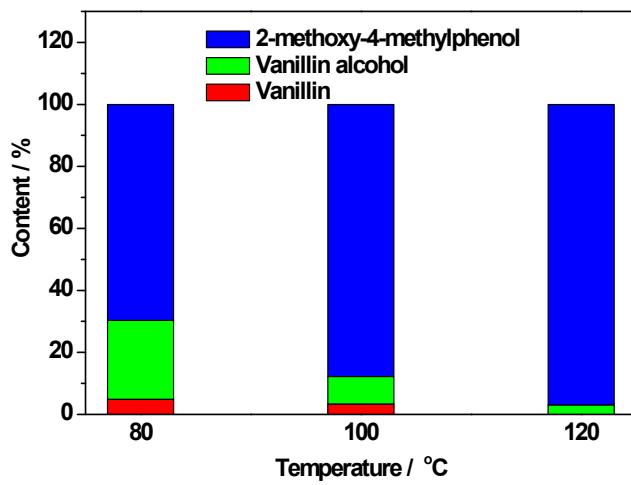


Fig. S5. Effect of reaction time on the conversion of vanillin over 2.0 wt.% Pd/SO₃H-MIL-101(Cr) (Reaction conditions: vanillin, 2 mmol; water, 20 ml; amount of catalyst, 50 mg; S/C = 200; hydrogen pressure, 0.5 MPa; reaction time, 60 min).

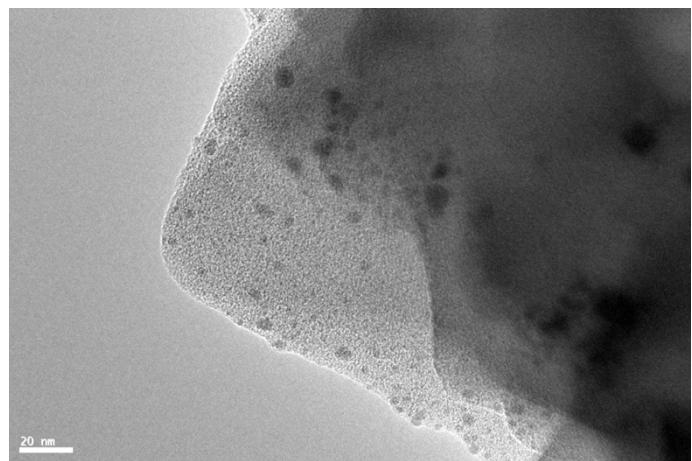


Fig. S6. TEM image of the used 2.0 wt.% Pd/SO₃H-MIL-101(Cr)