Supporting Information

Ordered Mesoporous Cr$_2$O$_3$ Frameworks Incorporating Keggin-type 12-Phosphotungstic Acids as Efficient Catalysts for Oxidation of Benzyl Alcohols

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Table S1. Elemental composition of mesoporous CrPWA(w) materials.

<table>
<thead>
<tr>
<th>sample</th>
<th>atomic ratio&lt;sup&gt;a&lt;/sup&gt; (Cr:P:W)</th>
<th>PWA loading&lt;sup&gt;b&lt;/sup&gt; (wt. %)</th>
<th>chemical formula&lt;sup&gt;c&lt;/sup&gt;</th>
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</thead>
<tbody>
<tr>
<td>CrPWA(17)</td>
<td>187.6:0.9:12</td>
<td>16.8 (17)</td>
<td>Cr₂O₃[H₃PW₁₂O₄₀]₀.₀₁₁</td>
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<tr>
<td>CrPWA(26)</td>
<td>105.9:0.9:12</td>
<td>26.3 (27)</td>
<td>Cr₂O₃[H₃PW₁₂O₄₀]₀.₀₁₉</td>
</tr>
<tr>
<td>CrPWA(38)</td>
<td>60.8:0.8:12</td>
<td>38.4 (43)</td>
<td>Cr₂O₃[H₃PW₁₂O₄₀]₀.₀₃₃</td>
</tr>
<tr>
<td>CrPWA(49)</td>
<td>38.8:0.8:12</td>
<td>49.4 (53)</td>
<td>Cr₂O₃[H₃PW₁₂O₄₀]₀.₀₅₂</td>
</tr>
</tbody>
</table>

<sup>a</sup> EDS data normalized to the twelve-atom W<sub>12</sub> unit. <sup>b</sup> In parenthesis: the theoretical weight percentage of PWA content according to the nominal composition. <sup>c</sup> Chemical formula on the basis of EDS results.
Fig. S1 SAXS pattern of mesoporous SBA-15. The indexing of the Bragg diffractions is consisted with a hexagonal $p\bar{6}mm$ unit cell with lattice parameter $a_0=10.6$ nm.
Fig. S2 (a) Nitrogen adsorption-desorption isotherms at 77K of mesoporous SBA-15 silica (BET surface area ~767 m\(^2\)g\(^{-1}\), total pore volume ~1.02 cm\(^3\)g\(^{-1}\)). (b) Pore size distribution calculated from the adsorption branch according to the NLDFT method. A framework wall thickness of ca. 3 nm was obtained from pore diameter (D\(_p\)=7.6 nm) and unit cell size (a\(_o\)=10.6 nm), according to the equation WT=a\(_o\)·D\(_p\).
Fig. S3 Typical EDS spectra obtained on TEM for mesoporous (a) CrPWA(26) and (b) CrPWA(38) sample. The copper peaks result from TEM Cu grid.
Fig. S4 Guinier plots (\(\ln(I(q)\cdot q) = \ln(I_0) - R_g^2\cdot q^2/2\), where \(R_g\) is the radius of gyration) for mesoporous (a) \(\textit{meso-}\text{Cr}_2\text{O}_3\), (b) CrPWA(17), (c) CrPWA(26), (d) CrPWA(38) and (e) CrPWA(49) samples.
Fig. S5 Infrared spectra for mesoporous (i) meso–Cr$_2$O$_3$, (ii) CrPWA(17), (iii) CrPWA(26), (iv) CrPWA(38) and (v) CrPWA(49) materials and (vi) H$_3$PW$_{12}$O$_{40}$ acid.
**Fig. S6** Diffuse reflectance UV/vis spectra for mesoporous (i) *meso*-Cr$_2$O$_3$, (ii) CrPWA(17), (iii) CrPWA(26), (iv) CrPWA(38) and (v) CrPWA(49) materials and (vi) H$_3$PW$_{12}$O$_{40}$ acid.
Fig. S7 Solvent effect on the catalytic activity of mesoporous CrPWA(38) catalyst
(Experimental conditions: 0.08 mmol of 1-phenylethanol, $8 \times 10^{-3}$ mmol of catalyst, 4 eq. of 30% H$_2$O$_2$, 2 mL CH$_3$CN, 50 °C, 1h).
Fig. S8 $^1$H NMR spectrum of the oxidation reaction of 1 with CrPWA(38) catalyst.
**Fig. S9** $^1$H NMR spectrum of the oxidation reaction of 4 with CrPWA(38) catalyst.
Fig. S10 $^1$H NMR spectrum of the oxidation reaction of 5 with CrPWA(38) catalyst.
Fig. S11 $^1$H NMR spectrum of the oxidation reaction of 6 with CrPWA(38) catalyst.
Fig. S12 $^1$H NMR spectrum of the oxidation reaction of 7 with CrPWA(38) catalyst.