Electronic Supplementary Information (ESI)

Facile Preparation of Ordered Mesoporous MnCo₂O₄ for Low-temperature Selective Catalytic Reduction of NO with NH₃

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Fig. S1 (A) Low-angle XRD patterns of SBA-15(a) and KIT-6(b).

(B) Nitrogen physisorption isotherms of SBA-15 and KIT-6 (Inset: pore size distribution calculated from desorption branch by BJH method)

Fig. S1 (A) presented the small-angle XRD patterns of KIT-6 and SBA-15. The low-angle XRD reflections confirmed the p6mm and Ia3d cubic symmetries of the pore system and the N$_2$-physisorption isotherms in Fig. S1 (B) showed the typical type IV isotherms with an H1-type hysteresis loop, indicating the presence of ordered mesopores. The structural parameters were summarized in Table S1.

<table>
<thead>
<tr>
<th>sample</th>
<th>$S_{\text{BET}}$[m$^2$g$^{-1}$]</th>
<th>$D_p$[nm]</th>
<th>$V_p$[cm$^3$g$^{-1}$]</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBA-15</td>
<td>603</td>
<td>5.1</td>
<td>0.63</td>
</tr>
<tr>
<td>KIT-6</td>
<td>730</td>
<td>6.9</td>
<td>0.52</td>
</tr>
</tbody>
</table>
Fig. S2. NO conversion in separate NO oxidation reaction over 3D-MnCo$_2$O$_4$, 2D-MnCo$_2$O$_4$ and B-MnCo$_2$O$_4$ at GHSV of 32,000 h$^{-1}$.

For low temperature NH$_3$-SCR, NO oxidation to NO$_2$ is very important to promote deNOx efficiency by accelerating the ‘‘fast SCR’’ process. Separate NO oxidation experiments were carried out and shown in Fig. S4, the B-MnCo$_2$O$_4$ sample showed low NO oxidation activity over the whole temperature range, while the relatively higher NO conversion to NO$_2$ could be achieved over the 2D-MnCo$_2$O$_4$ sample. Over the 3D-MnCo$_2$O$_4$ catalyst, much higher NO conversion to NO$_2$ could be obtained than with 2D-MnCo$_2$O$_4$ over the whole temperature range (e.g. 31% vs. 20% at 200 °C), which is consistent with the SCR performance. These results clearly indicate that the enhancement of low temperature SCR activity of 3D-MnCo$_2$O$_4$ catalyst is strongly associated with facilitation of a ‘‘fast SCR’’ process.
Fig. S3. NH₃ conversion in separate NH₃ oxidation reaction (A) and N₂O concentration (B) over 3D-MnCo₂O₄, 2D-MnCo₂O₄ and B-MnCo₂O₄ at GHSV of 32,000 h⁻¹.