Supporting Information

Synthesis of Fe_{0.32}Co_{0.68}/\gamma-Al_2O_3@C nanocomposite for depth treatment of dyes sewage based on adsorption and advanced catalytic oxidation

Zepei Bao, Lin Ye, Beibei Fang, Lijun Zhao*

Key Laboratory of Automobile Materials (Jilin University), Ministry of Education and School of Materials Science and Engineering, Jilin University, Changchun 130022, China.

*Corresponding author:
E-mail: lijunzhao@jlu.edu.cn; Fax: +86-0431-85095876

Fig. S1 (a) N\textsubscript{2} adsorption-desorption isotherms and b) the corresponding pore size distribution of \gamma-Al_2O_3@C calculated using the BJH method.
Fig. S2 HRTEM image of the as-synthesized Fe$_{0.32}$Co$_{0.68}$/γ-Al$_2$O$_3$@C nanocomposite.

Fig. S3 XRD patterns of: (a) Fe$_{0.32}$Co$_{0.68}$/γ-Al$_2$O$_3$@C composite and (b) Fe-Co oxide/γ-Al$_2$O$_3$@C composite.
Fig. S4 Raman spectra of the flower-like $\gamma$-Al$_2$O$_3$@C composite.

![Raman spectra](image)

Fig. S5 XPS spectra of the as-prepared Fe$_{0.32}$Co$_{0.68}$/γ-Al$_2$O$_3$@C: (a) C 1s, (b) O 1s.

![XPS spectra](image)

Table S1 Adsorption parameters got from the two kinetic models for the adsorption of Orange II on Fe$_{0.32}$Co$_{0.68}$/γ-Al$_2$O$_3$@C

<table>
<thead>
<tr>
<th>Kinetic models</th>
<th>$q_e$ (mg g$^{-1}$)</th>
<th>k</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pseudo-first-order</td>
<td>37.26</td>
<td>0.1914 (min$^{-1}$)</td>
<td>0.4997</td>
</tr>
<tr>
<td>Pseudo-second-order</td>
<td>970.87</td>
<td>0.0853 (g mg$^{-1}$ min$^{-1}$)</td>
<td>1</td>
</tr>
</tbody>
</table>

![Adsorption parameters](image)

Fig. S6 Mineralization of Orange II (90 mg L$^{-1}$) by the “Fe-Co oxide/γ-Al$_2$O$_3$@C +
PMS” system. (Degradation reaction conditions: [PMS] = 1.5 g L⁻¹, [catalyst] = 0.05 g L⁻¹, pH = 7.0 and T = 20 °C.)

Fig. S7 Removal efficiency of Orange II (200 mg L⁻¹) by different systems combining the adsorption and catalytic degradation.