Electronic Supporting Information (ESI)

Preparation of different shaped $\alpha$-Fe$_2$O$_3$ nanoparticles with large particle of iron oxide red

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Figure S1 (a) XRD pattern and (b) SEM image of iron oxide red.
Figure S2. SEM images of the samples prepared at 180 °C for different times (a) CH$_3$COOH 1h, (b) CH$_3$COOH 2h, (c) CH$_3$COOH 4h, (d) HCl 1h, (e) HCl 2h, (f) HCl 4h.
Table S1 The chemical composition of oxidized scale (mass/%)  

<table>
<thead>
<tr>
<th>Chemical composition</th>
<th>Fe$_2$O$_3$</th>
<th>CaO</th>
<th>SiO$_2$</th>
<th>Al$_2$O$_3$</th>
<th>MnO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass/%</td>
<td>99.18</td>
<td>0.05</td>
<td>0.05</td>
<td>0.15</td>
<td>0.37</td>
</tr>
</tbody>
</table>
Table S2: The crystal structure parameters, FTIR positions ($\nu_1, \nu_2$), band gap energies ($E_g$) and magnetic properties ($M_r, H_c$) of prepared α-Fe₂O₃.

<table>
<thead>
<tr>
<th>Sample</th>
<th>$A$ (Å)</th>
<th>$c$ (Å)</th>
<th>$\nu_1$ (cm⁻¹)</th>
<th>$\nu_2$ (cm⁻¹)</th>
<th>$E_g$ (eV)</th>
<th>$M_r$ (emu/g)</th>
<th>$H_c$ (Oe)</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>5.0180</td>
<td>13.7422</td>
<td>565</td>
<td>477</td>
<td>1.94</td>
<td>0.082</td>
<td>2441</td>
</tr>
<tr>
<td>HCl</td>
<td>5.0014</td>
<td>13.6827</td>
<td>546</td>
<td>475</td>
<td>2.04</td>
<td>0.139</td>
<td>1695</td>
</tr>
<tr>
<td>H₂SO₄</td>
<td>5.0170</td>
<td>13.7338</td>
<td>570</td>
<td>477</td>
<td>2.02</td>
<td>0.128</td>
<td>909</td>
</tr>
<tr>
<td>HNO₃</td>
<td>5.0089</td>
<td>13.7086</td>
<td>540</td>
<td>471</td>
<td>2.06</td>
<td>0.152</td>
<td>1045</td>
</tr>
<tr>
<td>CH₃COOH</td>
<td>5.0065</td>
<td>13.6932</td>
<td>562</td>
<td>481</td>
<td>1.98</td>
<td>0.141</td>
<td>480</td>
</tr>
</tbody>
</table>