Electronic supplementary Information (ESI)

For

Boosting Heterogeneous Fenton Reactions for Degrading Organic Dyes via Photothermal Effect under Neutral Conditions

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Figure S1. Distribution of MIC elements: (a) SEM; (b) C; (c) N; (d) Fe; (e) Si; (f) O.

Figure S2. XRD pattern of the Fe$_3$O$_4$ nanoparticles and MIC.
Figure S3. FTIR spectra of ultra-small Fe₃O₄ nanoparticles, PDA and MIC.

Figure S4. Thermogravimetric analysis (TGA) plot curve of MIC under with nitrogen atmosphere.
Figure S5. Homogeneous Fenton system (Fe^{2+}+H_2O_2) degraded MB solution at pH=4 and pH=7.

Figure S6. Removal efficiency of MIC+H_2O_2 and PDA+H_2O_2 to MB at different time.
Figure S7. Effect of acid (pH 4) and neutral conditions on dye removal efficiency of MIC.

Figure S8. Degradation efficiency of MIC to BPA(a) and TC(b), (experimental conditions: MIC: 250 μg mL⁻¹; BPA: 22.8 mg/L, TC: 100 mg/L, pH 7).
**Figure S9.** Effect of different temperatures on adsorption efficiency of MB by MIC (experimental conditions: MIC: 250 μg mL$^{-1}$; MB: 100 mg/L, pH 7).

**Figure S10.** Fluorescence spectra of 2-hydroxyterephthalic acid (a) with or (b) without the NIR laser.
**Figure S11.** The EPR spectra of DMPO-OH adducts in the MIC+$H_2O_2$ system.

**Figure S12.** (a) GC-MS spectra in the degradation process of MB and (b) total organic carbon (TOC) degradation rate of different organic pollutants.
Table S1. Catalytic performance of multifarious Iron-based materials in different physical fields.

<table>
<thead>
<tr>
<th>Catalysts/concentration</th>
<th>Dye concentration (mg/L)</th>
<th>Time (min)</th>
<th>Dye removal rate (%)</th>
<th>pH</th>
<th>Physical field</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCN-250 (Fe₂Mn)/327 μg mL⁻¹</td>
<td>15</td>
<td>270</td>
<td>100</td>
<td>2.0-12.0</td>
<td>Full-wavelength halogen lamp</td>
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<td>Fe³⁺/2.8 μg mL⁻¹</td>
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<td>8</td>
<td>100</td>
<td>3.3</td>
<td>VUV/UV</td>
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<tr>
<td>BASF-NPs/250 μg mL⁻¹</td>
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<td>140</td>
<td>100</td>
<td>7.0</td>
<td>UV</td>
<td>3</td>
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<tr>
<td>Fe²⁺/20 μg mL⁻¹</td>
<td>50</td>
<td>6</td>
<td>98</td>
<td>3.0</td>
<td>Microwave heating</td>
<td>4</td>
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<td>Fe⁰/1000 μg mL⁻¹</td>
<td>35</td>
<td>5</td>
<td>99</td>
<td>3.0</td>
<td>Ultrasound</td>
<td>5</td>
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<tr>
<td>Fe₃O₄/ZnO/grape-hene</td>
<td>40</td>
<td>60</td>
<td>100</td>
<td>13.0</td>
<td>UV+US</td>
<td>6</td>
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<td>SUS/Fe₃O₄/200 μg mL⁻¹</td>
<td>10</td>
<td>150</td>
<td>100</td>
<td>7.0</td>
<td>E beam</td>
<td>7</td>
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<tr>
<td>MIC (this work)/250 μg mL⁻¹</td>
<td>100</td>
<td>5</td>
<td>100</td>
<td>7.0</td>
<td>NIR irradiation</td>
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References


