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Self-regenerative and Self-enhanced Smart Graphene/Ag₃PO₄ Hydrogel Adsorbent under Visible Light

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Fig. S1. The thermal analysis curve of graphite oxide

Fig. S2. The adsorption isotherm and models of MB on rGO/Ag₃PO₄ composite
Figure (a): Graph showing the change in $q$ (mg/g) with respect to time (h). The graph exhibits an initial rapid increase followed by a plateau.

Figure (b): Graph illustrating the change in $\ln(Qe-Qt)$ (mg/g) with respect to time (h). The data points are plotted along a linear trend, indicating a first-order reaction rate.

$q$ (mg/g) vs. Time (h):

- Time 0 to 20 h: $q$ increases rapidly.
- Time 20 to 80 h: $q$ continues to rise but at a slower rate.
- Time 80 to 120 h: $q$ remains constant.

$\ln(Qe-Qt)$ (mg/g) vs. Time (h):

- Time 0 to 10 h: $\ln(Qe-Qt)$ decreases linearly.
- Time 10 to 40 h: The rate of decrease slows down.
Fig. S3 The adsorption kinetics curves (a), pseudo first-order adsorption kinetic models (b) and pseudo second-order adsorption kinetic models (c) of MB on rGO/Ag$_3$PO$_4$ composite
Table S1. Langmuir and Freundlich isotherms parameters of rGO/Ag3PO4 composite

<table>
<thead>
<tr>
<th>Absorbent</th>
<th>Adsorbate</th>
<th>Langmuir model</th>
<th>Freundlich model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$K_L$(l/mg)</td>
<td>$q_m$(mg/g)</td>
</tr>
<tr>
<td>rGO/Ag3PO4 composite</td>
<td>MB</td>
<td>11.83</td>
<td>109.47</td>
</tr>
</tbody>
</table>
Table S2. Kinetic parameters of pseudo first- and second-order adsorption kinetic models for MB on rGO/Ag₃PO₄ composite

<table>
<thead>
<tr>
<th>Dye</th>
<th>Initial conc. (mg/L)</th>
<th>$q_{e,exp}$ (mg/g)</th>
<th>Pseudo first-order model</th>
<th>Pseudo second-order model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>$k_1$ (min$^{-1}$)</td>
<td>$q_{e,cal}$ (mg/g)</td>
</tr>
<tr>
<td>MB</td>
<td>50</td>
<td>34.85</td>
<td>-0.3865</td>
<td>76.1351</td>
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