Supporting Information

Preparation of Small-Sized Graphene Oxide Sheets from Carbon Nanohorns and Their Biological Applications

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Figure S1. (a) Dispersion of the prepared S-GO in various solvents. (b, c) Fluorescence spectra of S-GO dispersed in organic solvents at excitation wavelengths of 345 nm (b) and 420 nm (c).
Figure S2. The fluorescence spectra of the prepared S-GO sample in aqueous solutions with different pH levels. The arrow indicates the fluorescence intensity decrease of S-GO in basic pH solutions.
Figure S3. The fluorescence spectra of S-GO-IgG and S-GO-BSA at an excitation wavelength of 400 nm.
**Figure S4.** The cytotoxicity of S-GO to HeLa cells (a) and RAW 264.7 macrophages (b), determined using a WST-1 assay. All data represent the mean ± SD of six independent replicates.
Equation S1.
The quantum yield of S-GO dispersed in ethanol was estimated using the following equation,[1] where \( QY \) is the quantum yield, \( I \) is the measured integrated emission intensity, \( \eta \) is the reflective index of the solvent, \( A \) is the optical absorption density, subscript “st” refers to a standard with known quantum yield (here, the standard sample used was a fluorescein-ethanol solution; \( QY_{st} = 0.79 \))[2], and subscript “x” refers to the sample.

\[
QY_x = QY_{st} \left( \frac{I_x}{I_{st}} \right) \left( \frac{\eta_x}{\eta_{st}} \right)^2 \left( \frac{A_{st}}{A_x} \right)
\]

The fluorescence spectrum and absorbance were measured at an excitation wavelength of 480 nm in a 10 × 10 mm fluorescence cuvette. The results are shown in Table S1.


Table S1. The quantum yield of S-GO at an excitation wavelength of 480 nm.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Integrated emission intensity (I)</th>
<th>Absorbance at 480 nm</th>
<th>Refractive index of solvent (( \eta ))</th>
<th>Quantum yield (( Q ))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluorescein</td>
<td>2066715</td>
<td>0.2638</td>
<td>1.36</td>
<td>0.79</td>
</tr>
<tr>
<td>S-GO</td>
<td>57248</td>
<td>0.147</td>
<td>1.36</td>
<td>0.039</td>
</tr>
</tbody>
</table>
Figure S5. DLS measurements of aqueous dispersions of S-GO-BSA, S-GO-cRGD and S-GO particles.