Supporting Information

Plant Leaf-Derived Graphene Quantum Dots and application for white LEDs

Prathik Roy\textsuperscript{a}, Arun Prakash Periasamy\textsuperscript{a}, Chiashain Chuang\textsuperscript{b}, Yi-Rou Liou\textsuperscript{b}, Yang-Fang Chen\textsuperscript{b}, Joseph Joly\textsuperscript{c}, Chi-Te Liang\textsuperscript{b} & Huan-Tsung Chang\textsuperscript{a}

\textsuperscript{a}Department of Chemistry, National Taiwan University, Taipei 106, Taiwan

\textsuperscript{b}Department of Physics, National Taiwan University, Taipei 106, Taiwan

\textsuperscript{c}Department of Nanotechnology, Noorul Islam University, Kumaracoil 629180, Tamilnadu, India

Correspondence: Correspondence and requests for materials should be addressed to H.T.C. (email: changht@ntu.edu.tw) or C.T.L. (ctliang@phys.ntu.edu.tw).
Supplementary Figure S1. (a) EDAX spectrum of the as-prepared N-GQDs. XRD spectrum (b) of N-GQDs, N-GO and (c) F-GQDs, F-GO.
Supplementary Figure S2. UV-Vis absorption spectra of (a) N-GO, F-GQDs and N-GQDs, (b) Quinine Sulfate (QS) and (c) Chlorophyll (CPY).
Supplementary Figure S3. Time-resolved PL decay profiles of (a) N-GQDs and (b) F-GQDs and (c) N-GQD/QS/CPY
Supplementary Figure S4. Illustration of the coating procedure of the N-GQD/QS/CPY emissive material onto the PET cap and light emission in the presence and absence of coating.
Supplementary Figure S5: PL spectrum of the uncoated PET cap.
Supplementary Figure S6: Photostability of the N-GQD/QS/CPY emissive material under illumination with a Xe lamp. PL wavelength at 440 nm ($\lambda_{ex} = 365$ nm).
<table>
<thead>
<tr>
<th>Material</th>
<th>$\tau_1$ (ns)</th>
<th>Percentage (%)</th>
<th>$\tau_2$ (ns)</th>
<th>Percentage (%)</th>
<th>Average $\tau$</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-GQDs</td>
<td>15.33 ± 0.21</td>
<td>57.84</td>
<td>3.10 ± 0.37</td>
<td>42.16</td>
<td>10.04</td>
</tr>
<tr>
<td>F-GQDs</td>
<td>14.09 ± 0.13</td>
<td>53.74</td>
<td>3.07 ± 0.29</td>
<td>46.26</td>
<td>8.99</td>
</tr>
<tr>
<td>N-GQD/QS/CPY</td>
<td>12.16 ± 0.18</td>
<td>24.55</td>
<td>4.15 ± 0.08</td>
<td>75.45</td>
<td>6.03</td>
</tr>
</tbody>
</table>

**Supplementary Table S1**: Lifetimes of GQDs and N-GQD/QS/CPY calculated from their corresponding time-resolved decay profiles

*PL decay curves were fitted to a two-exponential function: $I(t) = A_1\exp(-t/\tau_1) + A_2\exp(-t/\tau_2)$

**Quantum Yield equation**:

$$\Phi = \Phi_R \frac{I}{I_R} \frac{E_R n_R^2}{E n^2},$$

where $\Phi$ denotes quantum yield, $I$ is integrated fluorescence intensity, $E$ is extinction co-efficient, $n$= refractive index and the index $R$ indicates the standard.