Supporting Information

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

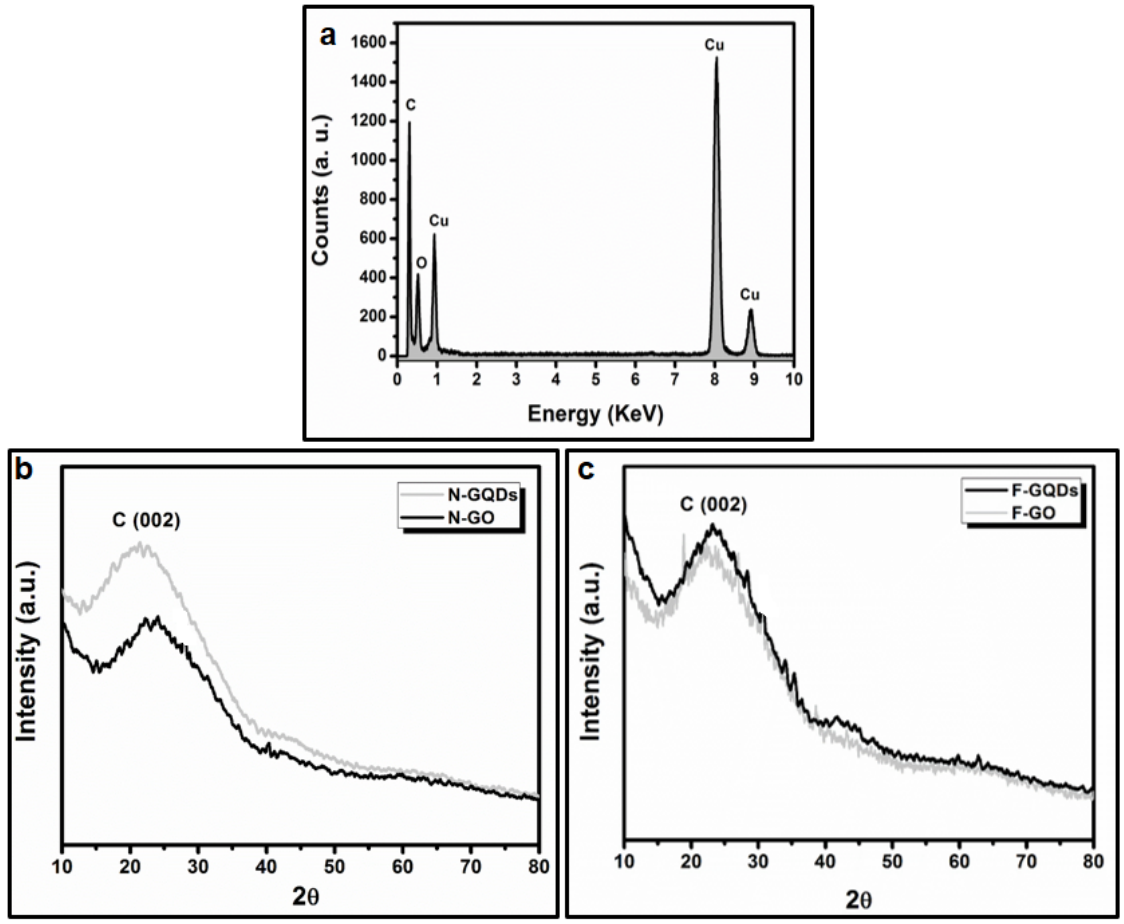
Prathik Roy[a], Arun Prakash Periasamy[a], Chiashain Chuang[b], Yi-Rou Liou[b], Yang-Fang Chen[b], Joseph Joly[c], Chi-Te Liang[b] & Huan-Tsung Chang[a]

[a]*Department of Chemistry, National Taiwan University, Taipei 106, Taiwan*

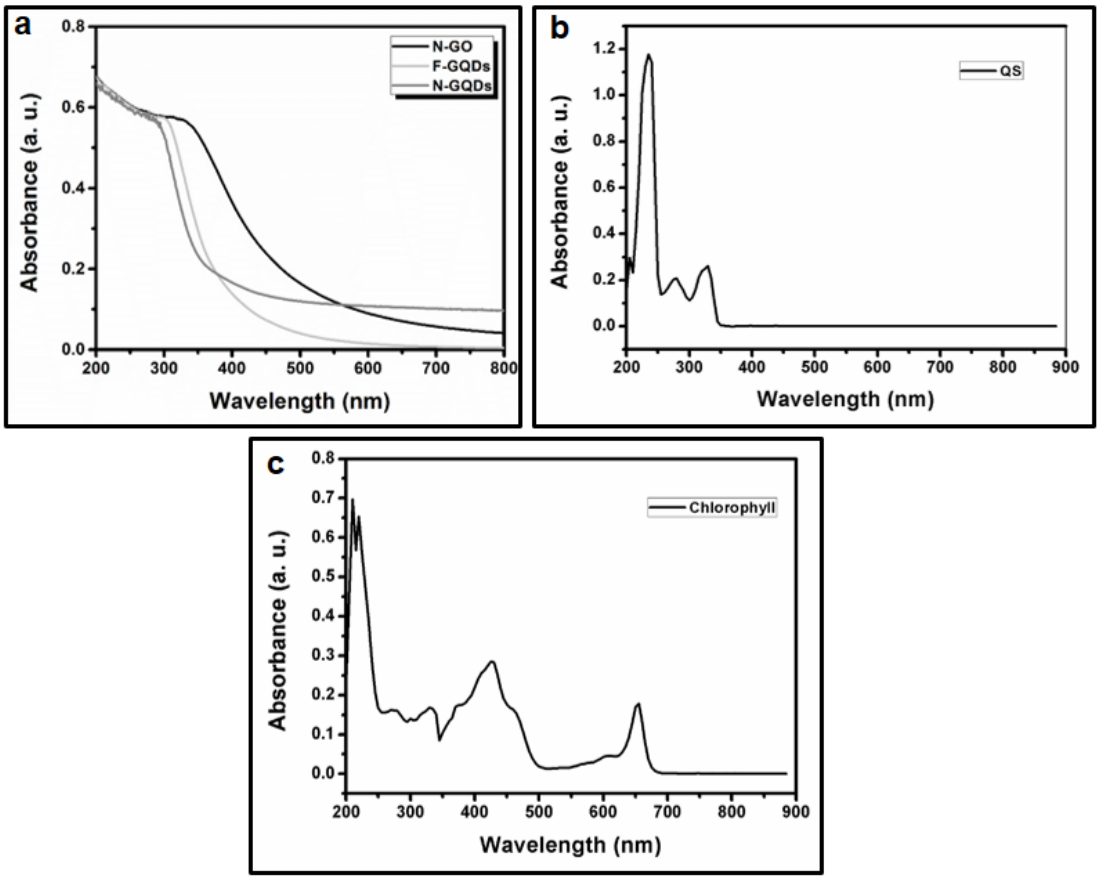
[b]*Department of Physics, National Taiwan University, Taipei 106, Taiwan*

[c]*Department of Nanotechnology, Noorul Islam University, Kumaracoil 629180, Tamilnadu, India*

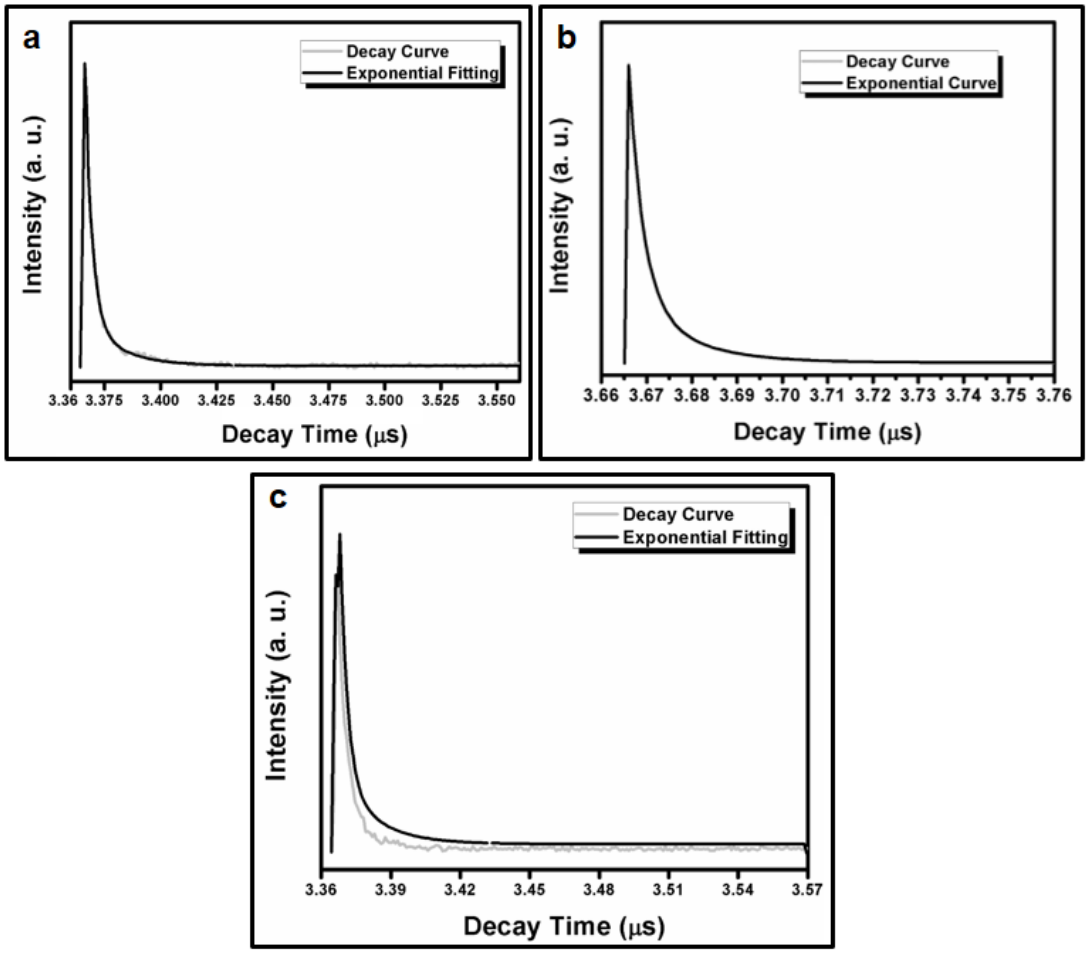
Correspondence: Correspondence and requests for materials should be addressed to H.T.C. (email: changht@ntu.edu.tw) or C.T.L. (ctliang@phys.ntu.edu.tw).



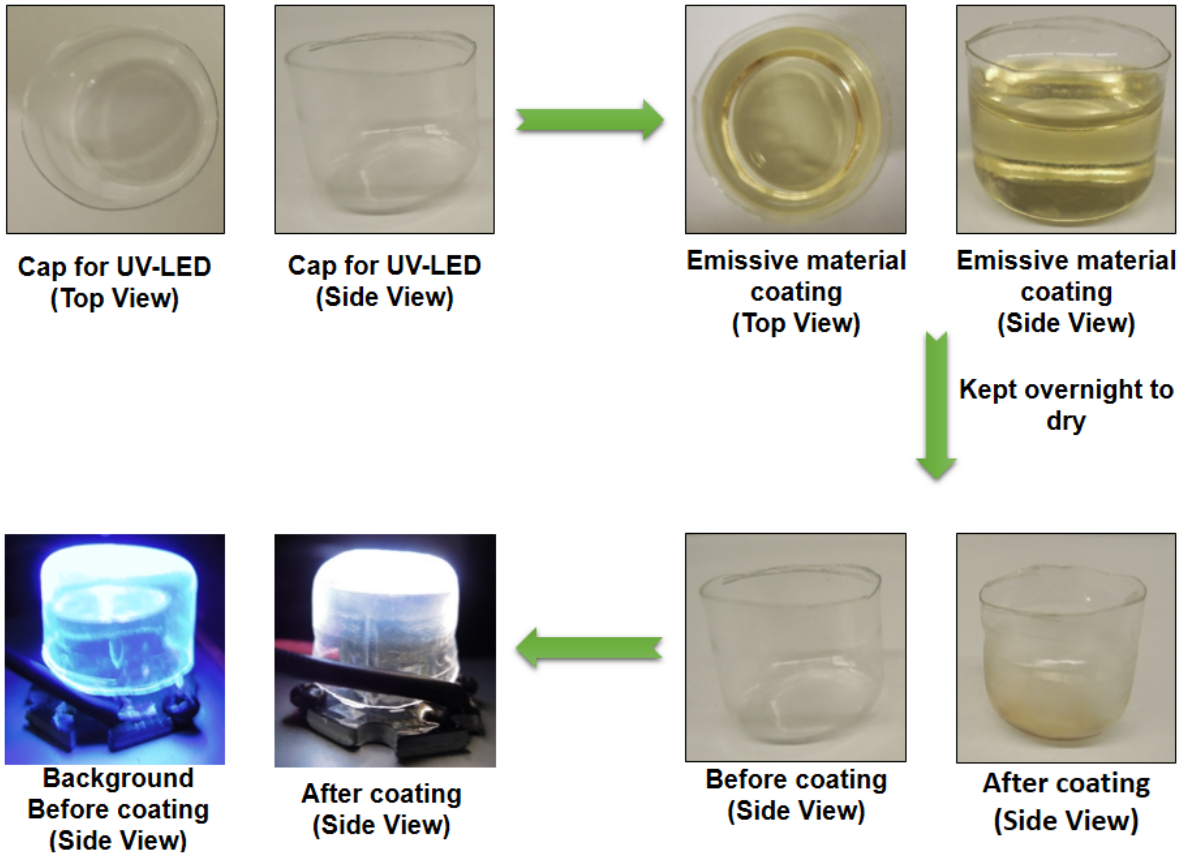
Supplementary Figure S1. (a) EDAX spectrum of the as-prepared N-GQDs. XRD spectrum (b) of N-GQDs, N-GO and (c) F-GQDs, F-GO.



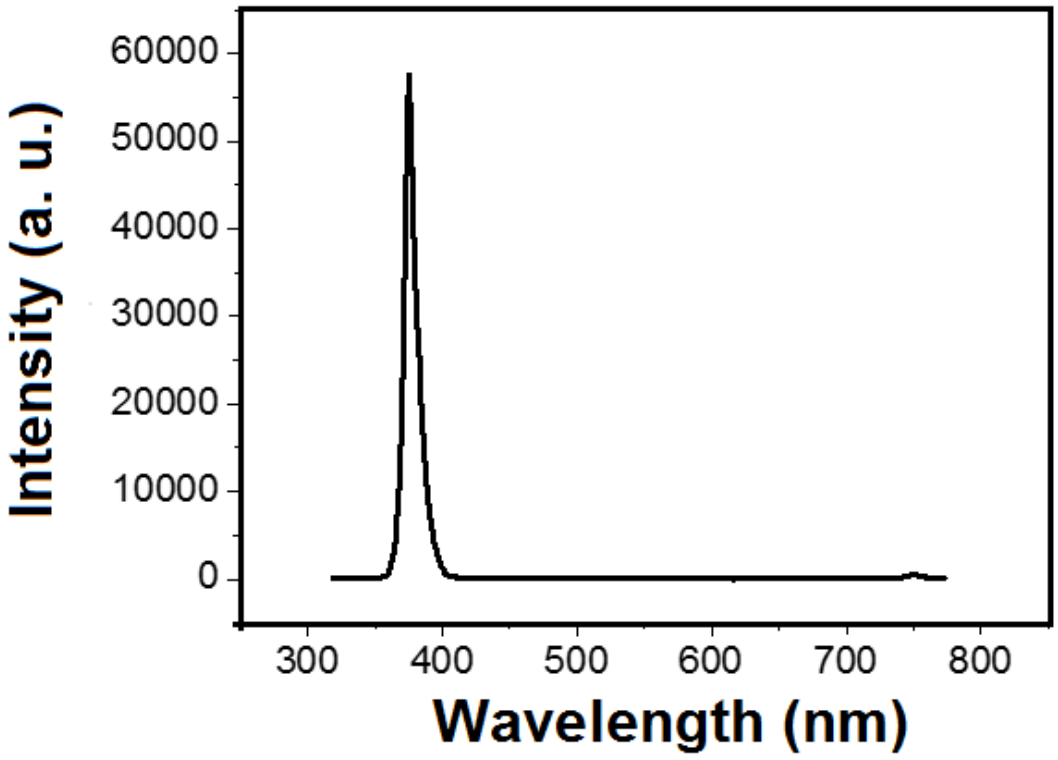
Supplementary Figure S2. UV-Vis absorption spectra of (a) N-GO, F-GQDs and N-GQDs, (b) Quinine Sulfate (QS) and (c) Chlorophyll (CPY).



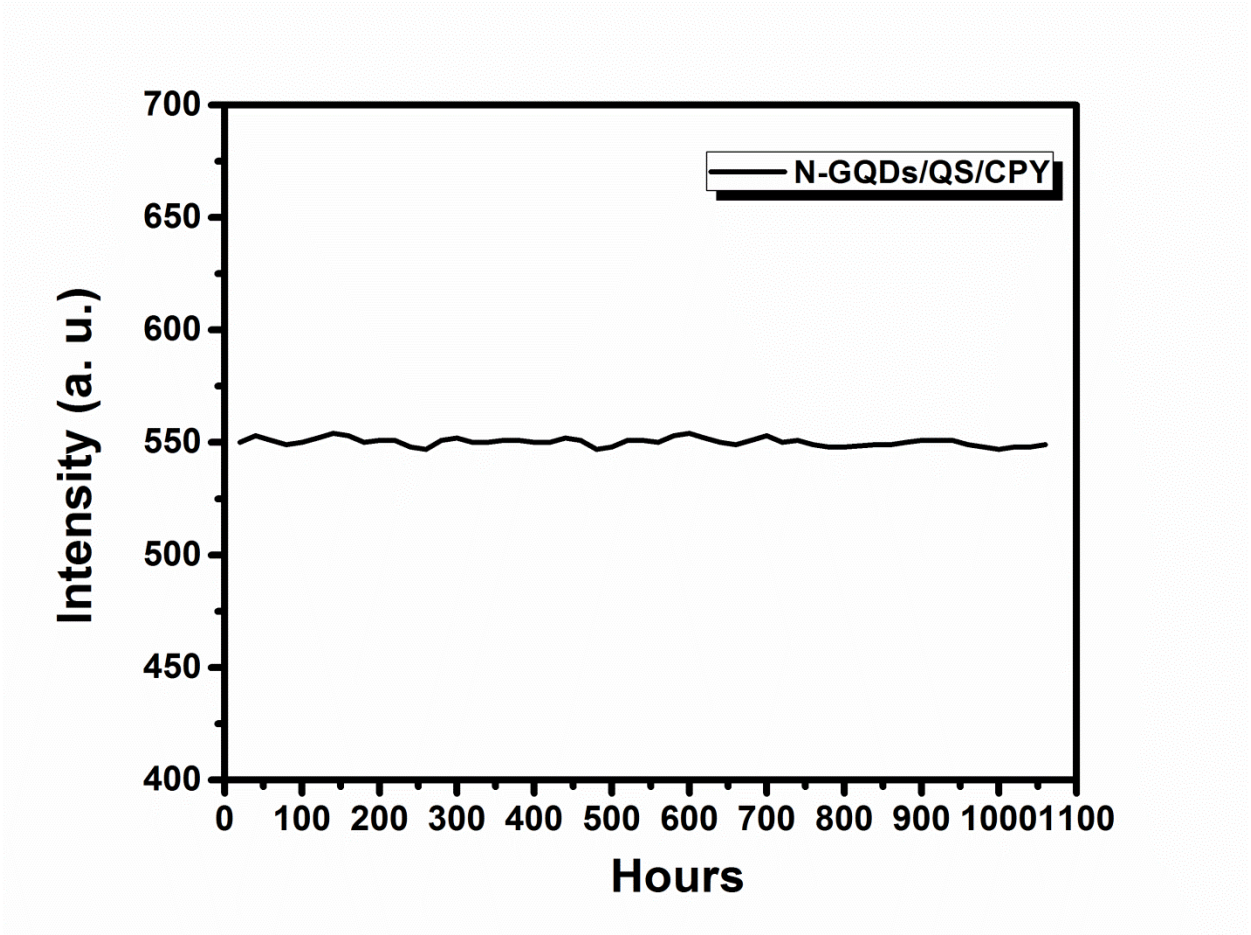
Supplementary Figure S3. Time-resolved PL decay profiles of (a) N-GQDs and (b) F-GQDs and (c) N-GQD/QS/CPY



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 (λ_{ex} = 365 nm).

Material	τ_1 (ns)	Percentage (%)	τ_2 (ns)	Percentage (%)	Average τ
N-GQDs	15.33 ± 0.21	57.84	3.10 ± 0.37	42.16	10.04
F-GQDs	14.09 ± 0.13	53.74	3.07 ± 0.29	46.26	8.99
N-GQD /QS/CPY	12.16 ± 0.18	24.55	4.15± 0.08	75.45	6.03

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:

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

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