

Supporting Information

Carbon Dot-Silica-Phosphor Composite with Dual-Emitting Core-Shell

Structure for White Light-Emitting

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Characterization

Transmission electron microscopy (TEM) images were taken in a FEI Tecnai12 transmission electron microscope. Scanning electron microscopy (SEM) images were carried out using a XL-30-ESEM (FEI). The X-ray diffraction (XRD) patterns were collected using a Persee XD-2X/M4600. The UV-Vis absorption spectra were recorded by an ultraviolet-visible spectrofluorometer (UV-2550, Shimadzu) under the mode of “Absorbance”. Photoluminescence spectra were recorded with a fluorescence spectrofluorometer (F-7000, Hitachi). The quantum efficiency was measured on a FLS980 fluorescence spectrophotometer.

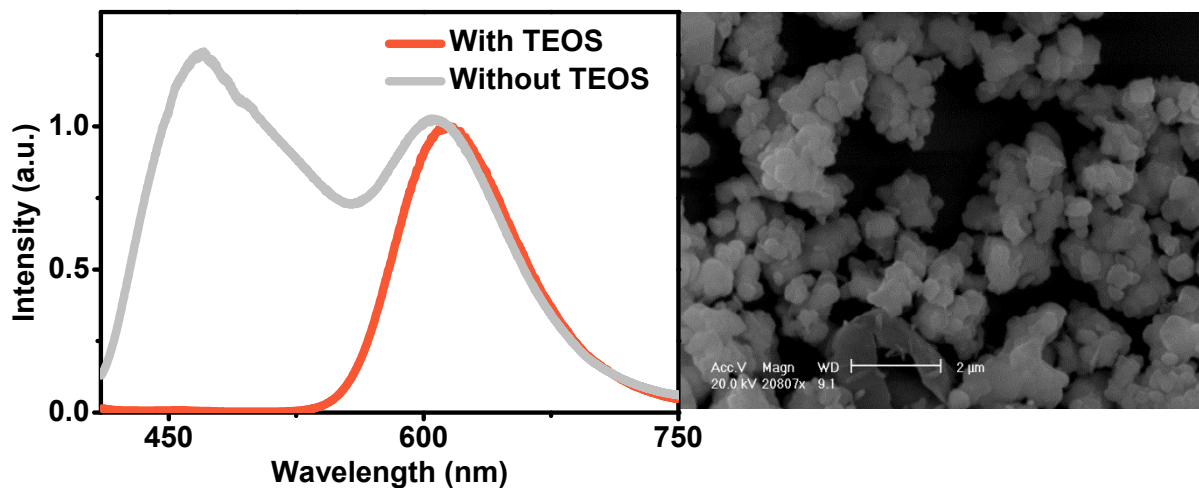


Fig. S1 Fluorescent emission spectra of the samples with and without TEOS as reactant (left). SEM image of the sample without using TEOS.

Note: In emission spectra, no blue emission peak is observed when the sample was prepared without using TEOS. And the morphology of this product is similar to that of phosphor according to the SEM images. These demonstrate that the phosphor is unable to be coated with CDs directly in the absence of TEOS.

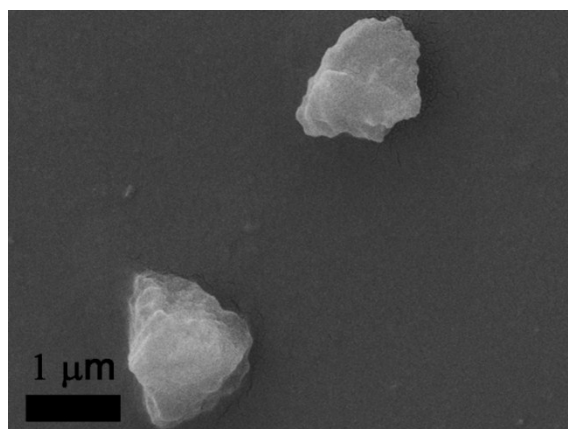


Fig. S2 SEM image of CDSP.

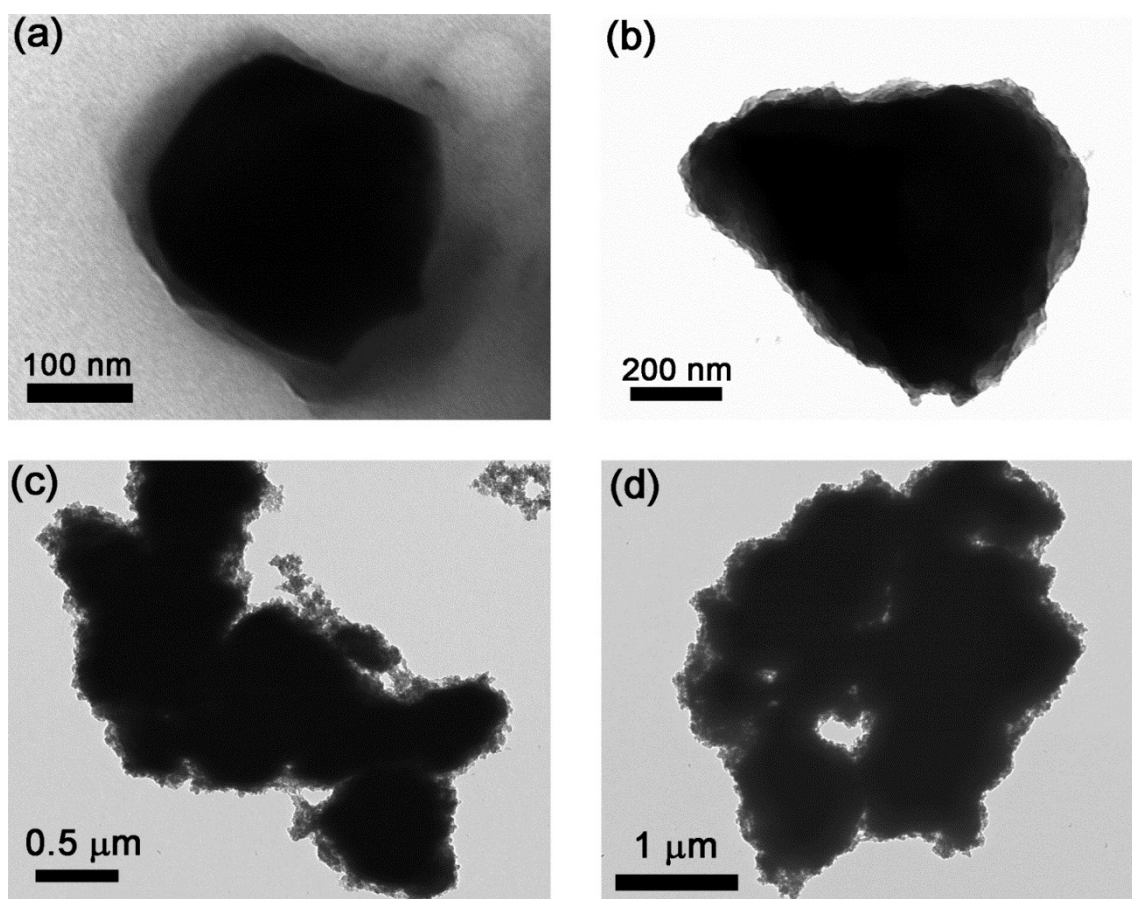


Fig. S3 (a), (b), (c) and (d) TEM images of CDSP.

Note: a) and b) show the single particle of CDSP while c) and d) show the multi-particles of CDSP.

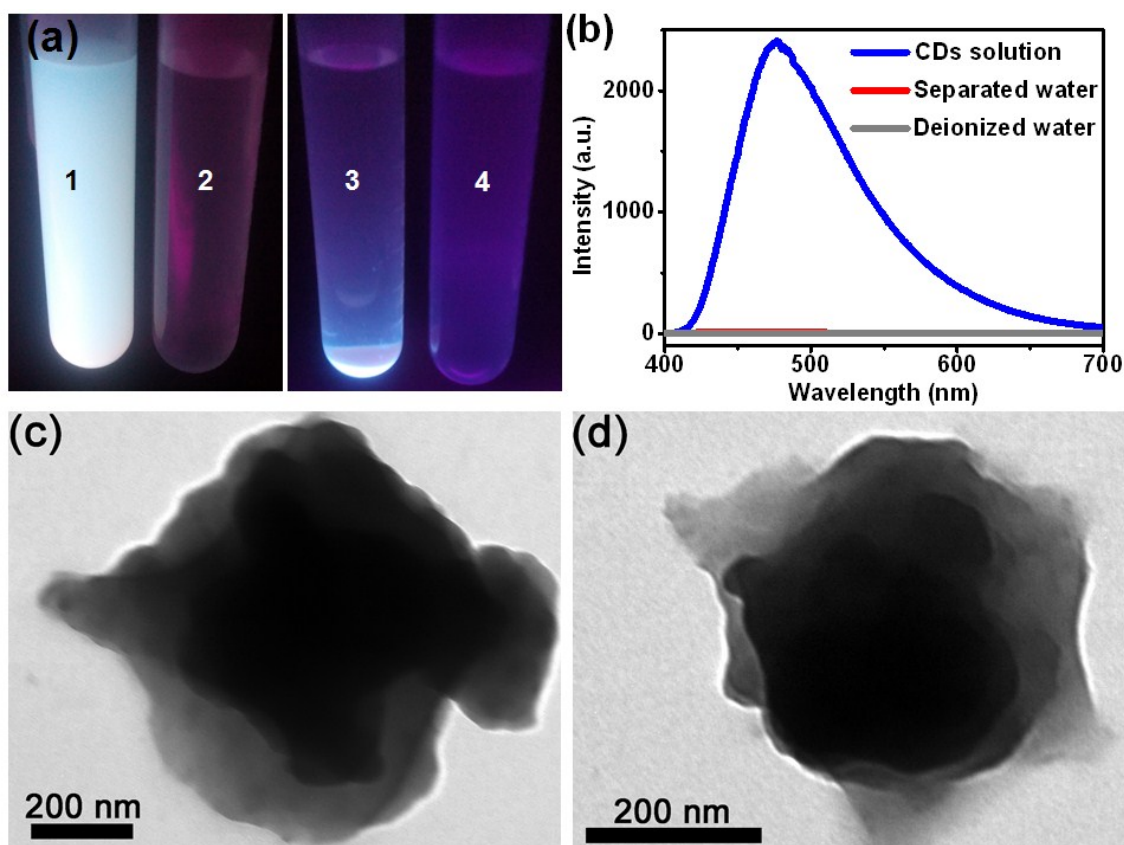


Fig. S4 (a) Photographs of deionized water (2 and 4), CDSP suspension after sonication (1) and centrifugation (3) under UV lamp of 365 nm. (b) Fluorescence emission spectra of CDs aqueous solution (10 mg/mL), separated water from CDSP suspension, and deionized water. (c) and (d) TEM images of CDSP before and after sonication.

Note: CDSP powder was put into water and then sonication was carried out for 30 min. Then centrifugation was made to separate the CDSP from water. No obvious blue emission related to CDs was observed in the separated water, and no change of the morphology occurred in the separated CDSP compared with the CDSP without sonication, indicating the mechanical vibration did not separate the CDs and phosphor. The above results demonstrate that CDSP is not simply caused by aggregation of phosphor and CDs but formed by firmly coating the phosphor with CDs-silica layer.

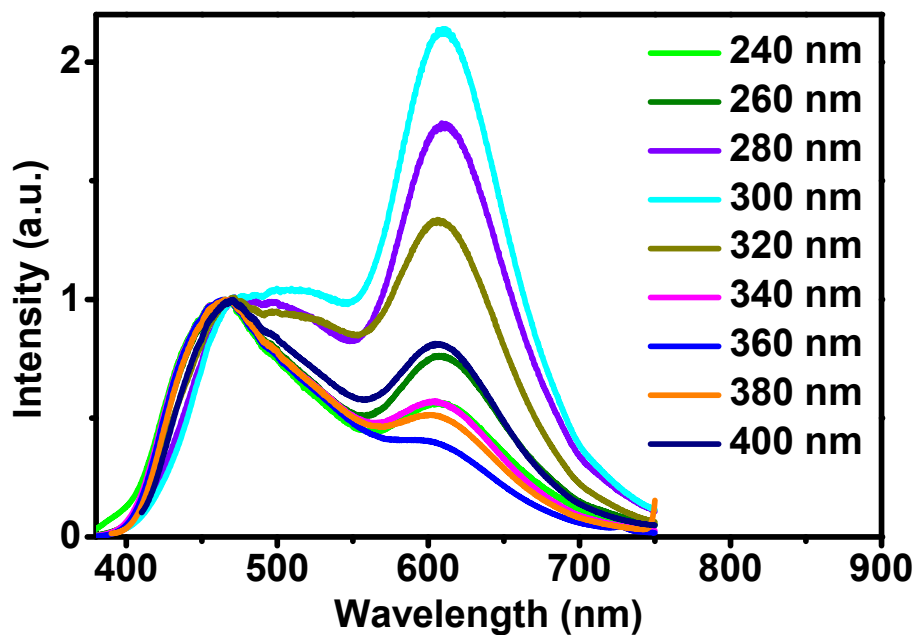


Fig. S5 Normalized fluorescent emission spectra of CDSP under different excited wavelength.

Note: The intensity ratio between blue and orange component (I_b/I_o) is relevant to their excitation spectra respectively.

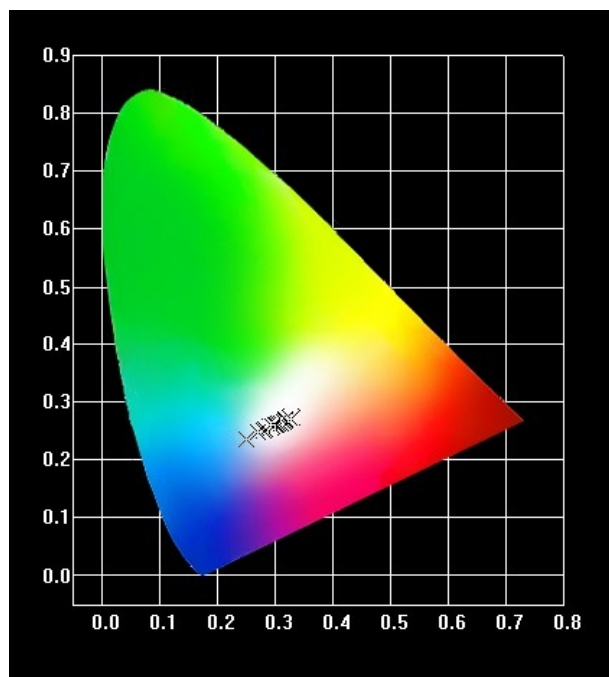


Fig. S6 CIE coordinates of CDSP at different irradiation time.

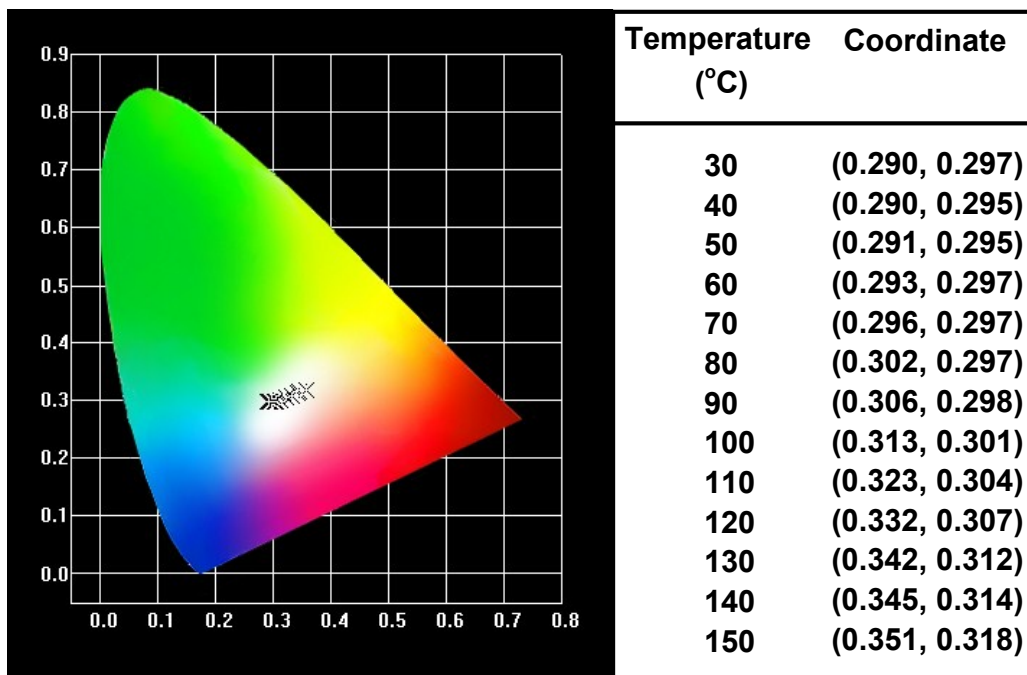


Fig. S7 CIE coordinates of CDSF at different temperature.

Table S1 Colour rendering index (CRI), colour temperature (T_c) and Commission Internationale de l'Eclairage (CIE) of CDSP-based WLED.

Voltage (V)	Current (mA)	CRI	T_c (K)	CIE
3.25	20	94	7283	(0.30, 0.33)
3.5	60	90	7354	(0.30, 0.33)