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Supplementary Information

Efficient long lifetime Room Temperature Phosphorescence of carbon dots in potash alum matrix

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Experimental section

Chemicals:

Potash alum, ethanolamine and hydrogen peroxide aqueous solution (30%hydrogen peroxide) were of analytical-reagent grade and purchased from Sinopharm Chemical Reagent Co., Ltd (Shanghai, China). Deionized water with a resistivity of 18.1 MΩ cm was used for all experiments.

Preparation of carbon dots:

In the synthesized experiment of Carbon dots, the ethanolamine (3 ml) in a beaker (200 ml) was pyrolyzed in the stove at 150 ^{o}C under air environment for 2 hours. The color of liquid changed from colorless to bright yellow liquid after 1 hour, and then dark at last, implying the formation of N-CD1.

Instrumentation

The morphologies of the samples were observed by JEM-2100 microscope (Japan, JEOL) with an accelerating voltage of 200 kV. X-ray

diffraction (XRD) analysis was carried out using a D8 Advance, Bruker AXS Corporation, Germany. FTIR spectra were recorded on a Bruker (Germany) VERTEC 80v vacuum FTIR spectrometer. The UV-Vis absorption spectra were recorded on a Perkin-Elmer Lambda 950 UV-Vis-NIR spectrophotometer. The photoluminescent (PL) spectra were recorded using a fluorescent spectrophotometer (F-4600, Hitachi, Japan). Phosphorescence measurements were performed on a Hitachi F-4600 spectrofluorometer (Hitachi Co. Ltd., Japan) in the phosphorescence mode. Time-resolved fluorescence and phosphorescence decay by delay was measured using a steady-state & time-resolved fluorescence spectrofluorometer (QM/TM/IM, PTI, USA).

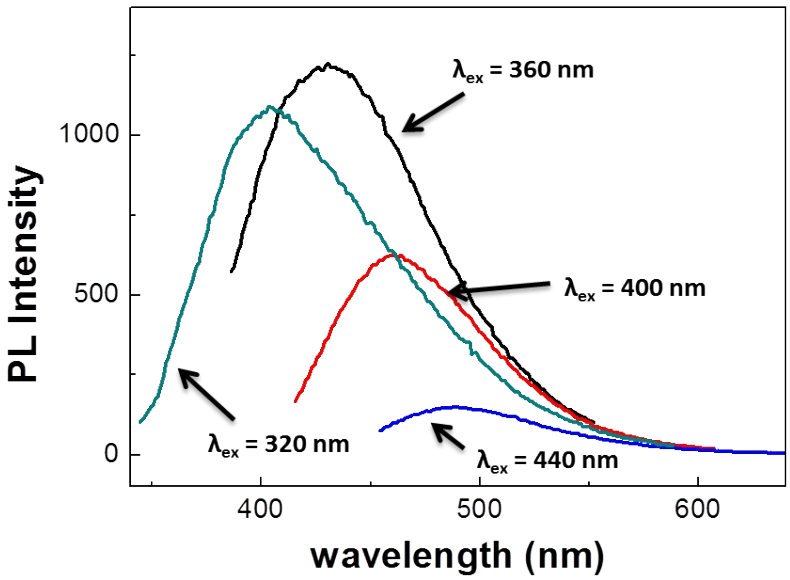

Fig. S1 Emission spectra for the carbon dots dispersed in water at excitation

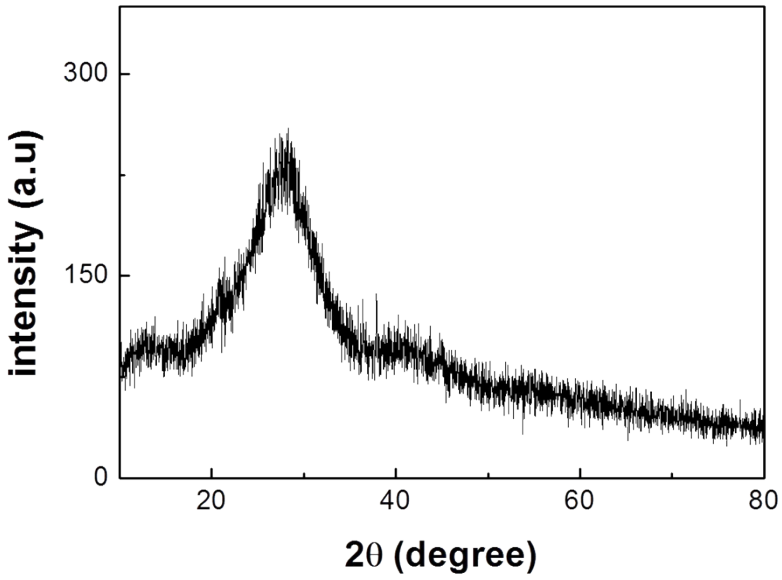

Fig. S2 X-ray diffraction patterns of the CDs-APS1 composite powders.

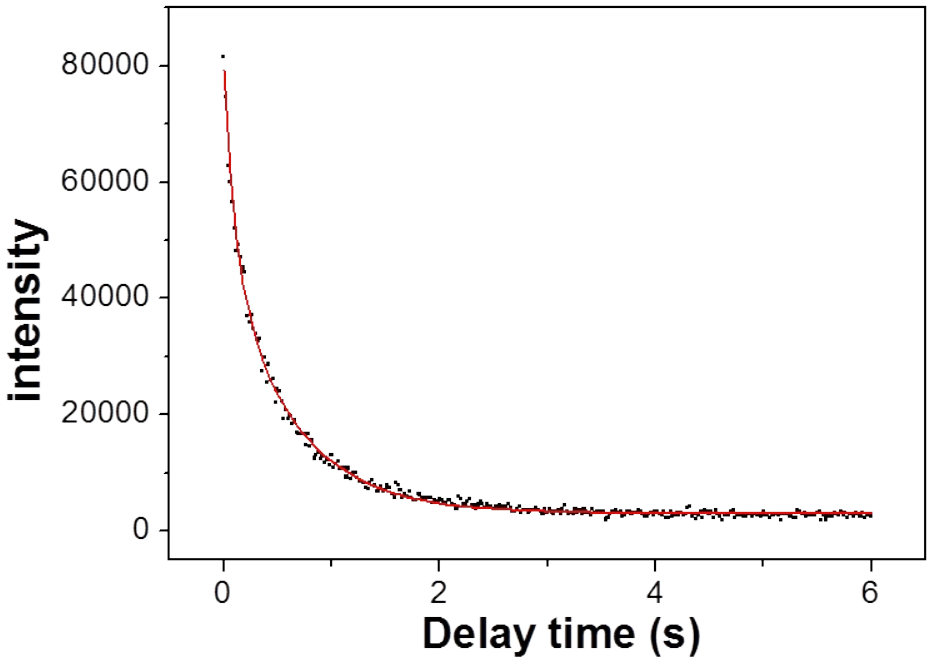

Fig. S3 Time resolved phosphorescence decay(λex = 360 nm, λem =500nm) of the CDs-APS3 powders

The CDs-KAl(SO4)2 · x(H2O) composite powders dried in an oven under 60 °C (CDs-APS3) for two days have been obtained. The CDs-APS3 powders own two phosphorescence lifetimes of 616 ms (57.0%) and 105ms (43.0%). The long phosphorescence lifetimes is 616 ms and average lifetimes is 558 ms which is smaller than CDs-APS1 but more than CDs-APS2.

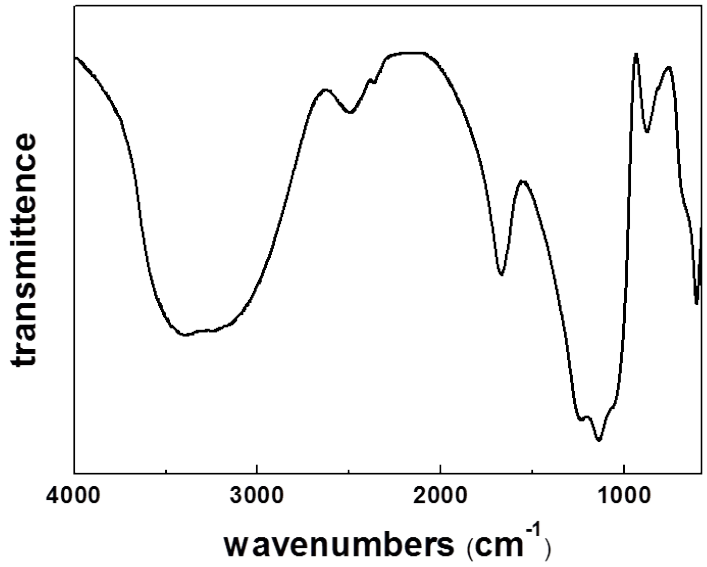

Fig. S4 Typical FTIR spectra of the CDs-APS1 powders.

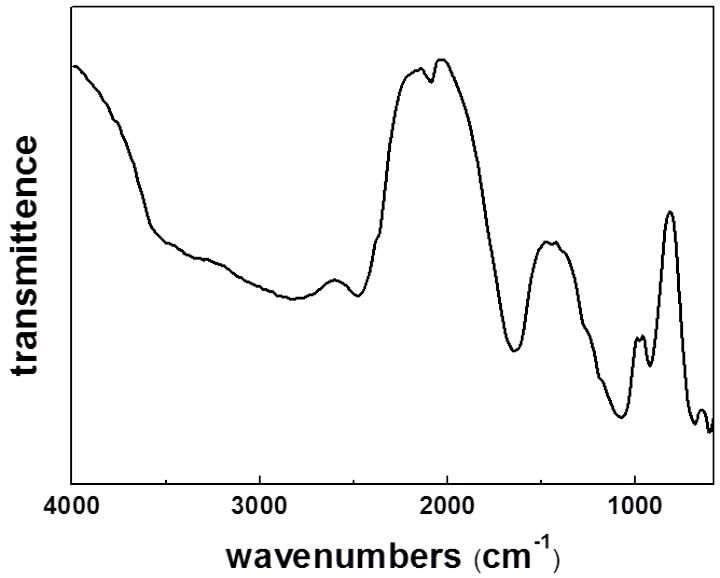

Fig. S5 Typical FTIR spectra of the CDs-APS2 powders.

As shown in the Fig. S4 and Fig. S5, The peak around 1650 cm^{-1}, assigned the C=O stretching of the amide bond of CDs-APS1 and CDs-APS2, is different obviously from the CDs. The peaks of C=O stretching are more smooth.