Electronic Supplementary Material (ESI) for New Journal of Chemistry

Mechanically Strong and Highly Luminescent Macroporous Monolith by Crosslinking of Carbon Nanodots

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1. Dynamic light scattering measurement of the CDs

The average size of the CDs is acquired based on the measurement of dynamic light scattering (Fig. S1). The CDs suspension demonstrates a narrow size distribution with a mean diameter of 4.5 nm ± 0.7 nm.

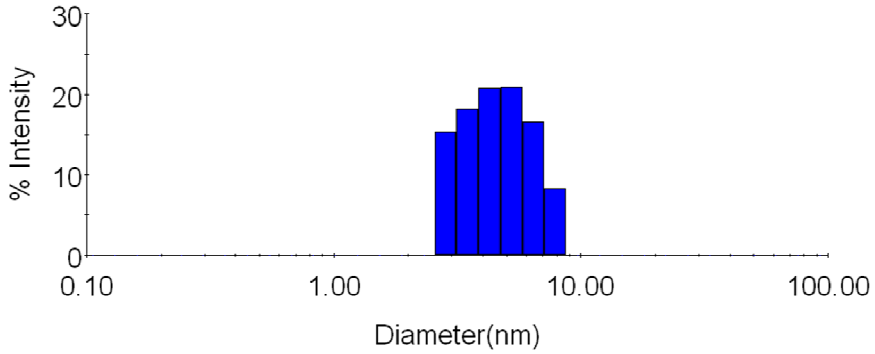

Fig. S1 Size distribution histogram obtained from the dynamic light scattering measurement of the CDs in ethanol.

2. Excitation Spectra of CDs, NM and RM

The excitation spectral of CDs in ethanol are showed in Fig. S2, as the emission at 450 nm, the sample has a maximum excitation at 360 nm. The NM and RM have similar excitation spectra, at the emission peak 526 nm, the excitation spectra show a big excitation peak at 450 nm and a small peak at 500 nm.

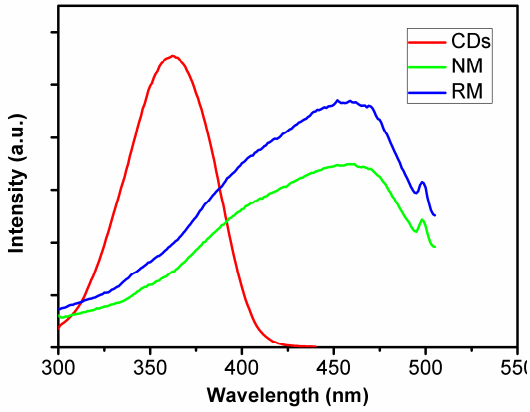

Fig. S2 Excition spectra of CDs in ethanol, NM and RM

3. Emission decay of CDs, NM and RM

The lifetime of CDs in ethanol is 5.35 ns, whereas the lifetime of prepared NM increased to 7.78 ns, which might attribute to its rigid structure. The RM presents a same lifetime to NM, suggesting that cross-linked tri-isocyanate do not influence its optical property.

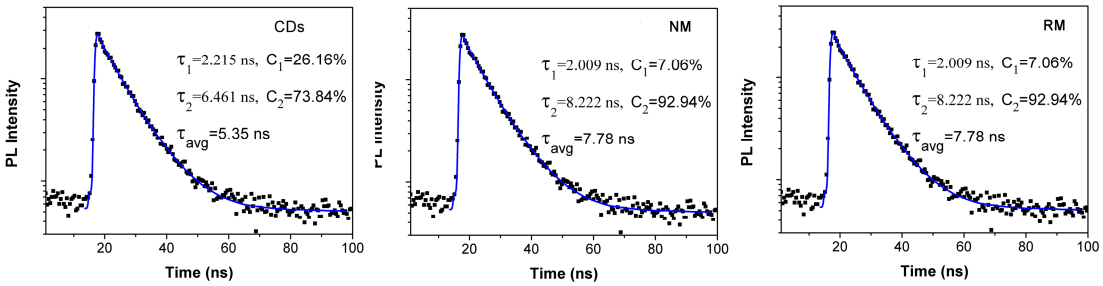

Fig. S3 PL Decay Lifetime of CDs, NM and RM excited at 360 nm, scatter plots are measured data, and blue curves represent fits.

4. FTIR spectra of CDs, NM and RM

As shown in Fig. S4, in contrast to CDs, two bands at 1130 cm^{-1} and 1033 cm^{-1} which are the typical vibrations of Si-O-Si were observed on both samples. It is hard to indicate carbonyl stretch of tri-isocyanate because it overlap with the vibration of HN-C=O group of CDs.

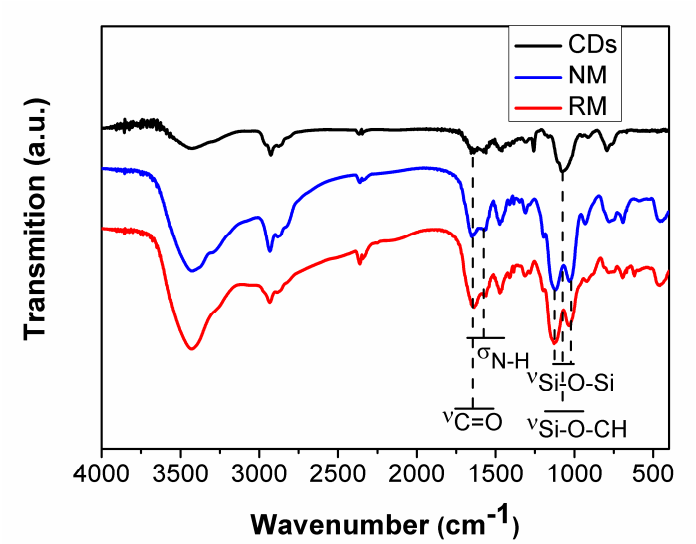

Fig. S4 FTIR spectra of CDs, NM and RM.

5. RM with different amount of CDs

Hybrid RM with different amount of CDs can be obtained by adding corresponding amount of MTMS in the gelation step. The Hybrid RM also show strong luminescence under the UV light.

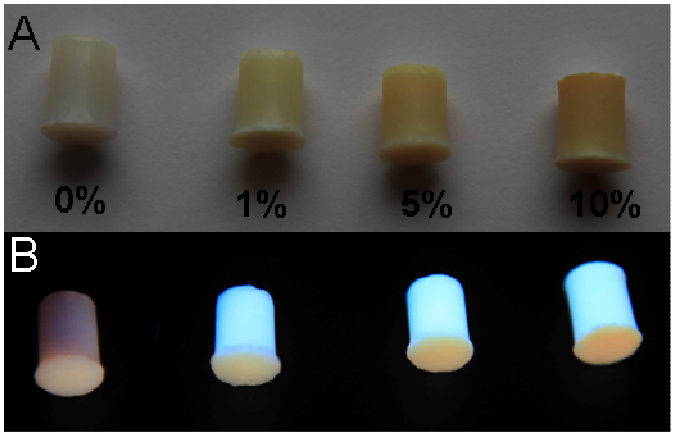

Fig. S5 RM with different CDs ratio under day light (A) and UV light (B).

6. Energy dispersive X-ray spectroscopy analysis of NM and RM

The EDX shown that both NM and RM are consiste of C, N, O and Si. In contrast, the weight ratio of Si is reduced in RM, confirmed the tri-isocyanate reinforced reaction.

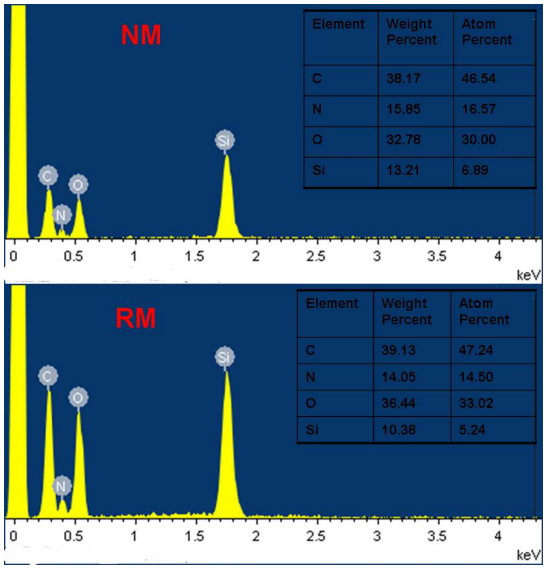

Fig. S6 EDX analysis of NM and RM:

7. The N_2 adsorption measurements

The N_2 adsorption measurements reveal that NM and RM have a poor mesoporosity, both of the adsorption volume are less than 3 mL/g.

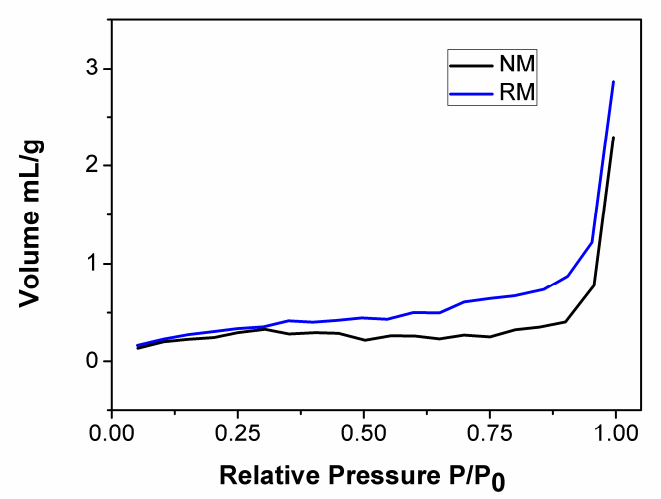

Fig. S7 N_2 adsorption curves of NM and RM.

8. Various RM

The density of the RM can be easily changed by the amount of the acetonitrile. Three samples were prepared by adding 0.5 mL of CDs into 0.2 mL of water and different amount of acetonitrile, herein, the amount of the acetonitrile was chosen as 0.2 mL, 0.35 mL and 0.5 mL, respectively. As shown in Fig. S8A, the as resulted samples have obvious size difference. Under the UV light, strong luminescence was observed (Fig. S8B).

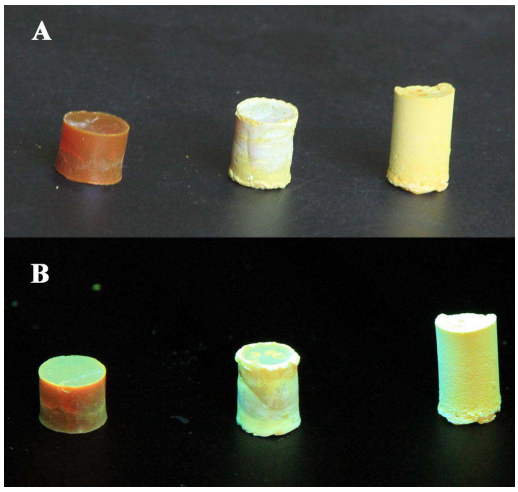

Fig. S8 Typical photographs of different RM under excitation of day light (A) and UV

lamp (B).

9. Thermogravimetric analysis

The thermal stability of samples was investigated with thermogravimetric analysis (TGA). The weight loss from room temperature to 120 ^{o}C of both samples is due to physisorbed water. The NM showed a very slow weight loss after sintering at 120 ^{o}C, however, the RM demonstrated an obvious weight loss at around 150 ^{o}C, which might result from the decomposition of tri-isocyanate.

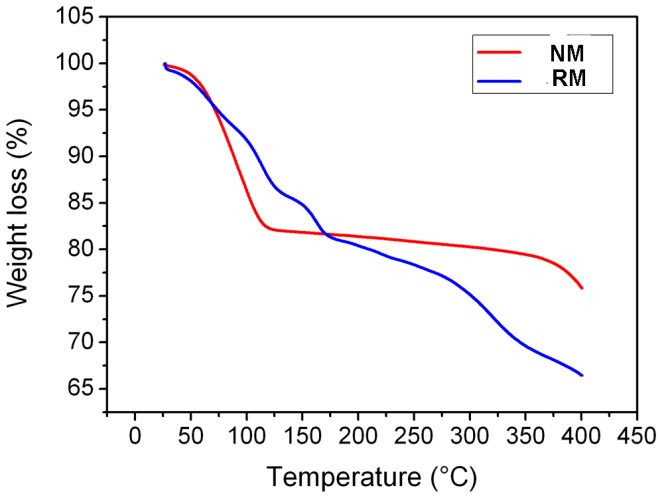

Fig. S9 TGA curves of NM and RM under nitrogen flow.