Supporting information

Multi-emission CdTe quantum dots nanofluids

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Experimental Section

Preparation of Water-Soluble CdTe QDs: Mercaptoacetic acid (MPA) capped CdTe QDs were prepared according to the literature.[15] In a typical procedure, cadmium chloride ($CdCl_2 \cdot 2.5H_2O$, 95 mg) and MPA (70 μL) were mixed in a three-necked flask in the presence of double-distilled water (3 mL), and then adjusted the pH value of the mixture solution to 11 by adding NaOH (1 M). The mixture was stirred for about 30 min under the protection of nitrogen. At the mean time, Te power (33 mg) was stirred with $NaBH_4$ (148 mg) in the presence of double-distilled water (2 mL) to produce NaHTe served as Te source, which may take more than one hour. The formed colorless NaHTe aqueous was injected into the three-necked flask by a syringe with long pinhead avoiding been exposed in the air. The as-prepared highly fluorescent CdTe QDs was obtained after refluxing in a 90 °C oil bath for 2 hours, followed by repeating centrifugation to remove excess Te power. Finally, diluted with double-distilled water to adjust the pH value to 8 for further use, and at this time the emission of the CdTe QDs is 527 nm.

Preparation of multi-emission CdTe QDs nanofluids: Excess (20 equiv.) PEG-TA [$C_{18}H_{37}N(CH_2CH_2O)_n H\text{-}(CH_2CH_2O)_m H$, ($n + m = 30$)] was added to aqueous solution of MPA-capped

CdTe QDs (10 mL) under uniform magnetic stirring and left to react for about 6 h, reaction temperature was controlled at room temperature (30), 50, 80 and 90 °C by oil bath, respectively. The resultant PEG-TA-QDs solution was washed by isopropanol and centrifuged twice to remove excess PEG-TA. After that, the obtained wax-like and viscous materials were redispersed into less double-diluted water, and vacuum dried under room temperature until solvents volatilized completely. The resultant wax-like QDs nanofluids were collected after two days or longer.

Characterization: TEM was carried out on a JEOL-JEM 2010 electron microscope operating at 200 kV. IR spectra were collected on a Thermo Nicolet NEXUS IR spectrometer in the wavenumber range 400-4000 cm^{-1} using KBr pellets. DSC traces were subjected to a cycles of heating from 30 °C to 100 °C, holding for 1.0 min at 100 °C, and then cooling to -50 °C at a heating rate of 20 $°C \cdot min^{-1}$ under nitrogen protection, and TGA traces were measured with the temperature rising from 30 to 700 °C under nitrogen flowing, at a heating rate of 20 $K \cdot min^{-1}$. The modulus G' and G" of the resultant nanofluid were recorded as temperature increasing from 30 to 80 °C. Fluorescence spectra were acquired on a Fluoromax-P luminescence spectrometer (HORIBA Jobin Yvon Inc.), and the corresponding UV-visible (UV-vis) absorption spectra were taken at room temperature on a UV-2501 spectrophotometer (SHIMADZU CORPORATION) with a variable wavelength between 200 and 800 nm. Flowing photos of multi-emission nanofluids were shot by a digital camera.

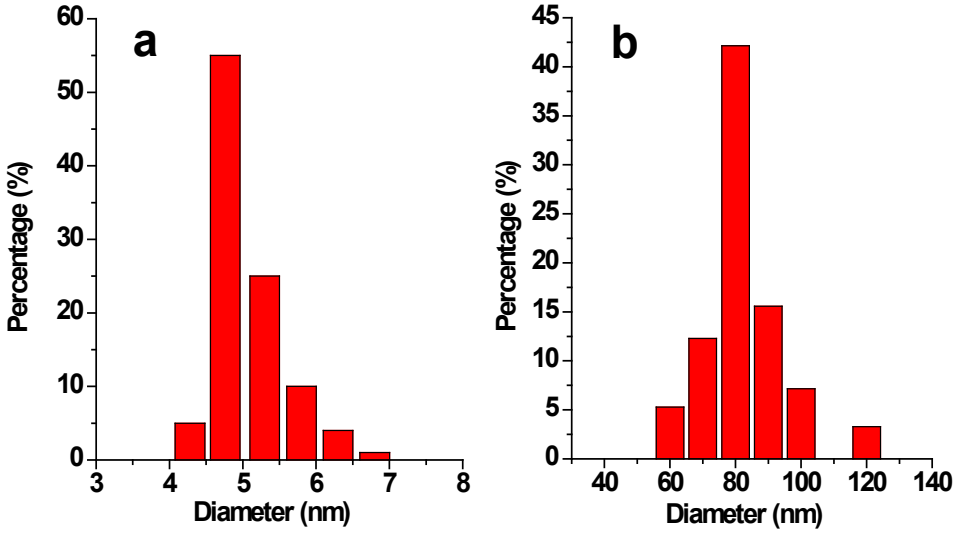

Fig. S1 Particle size histograms of a) MPA-QDs and b) PEG-TA capped QDs.

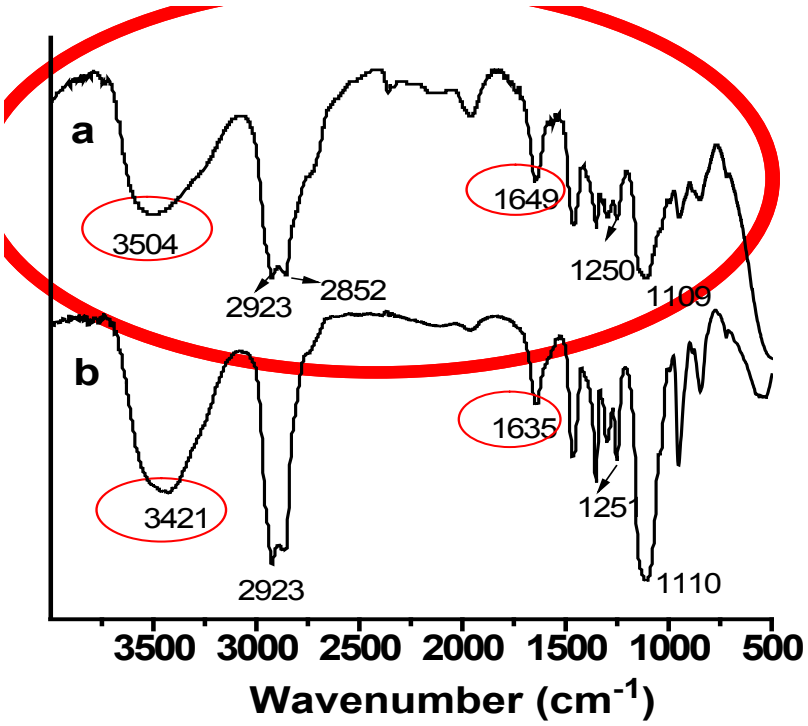

Fig. S2 FTIR spectra of a) pure PEG-TA; b) PEG-TA capped CdTe QDs.

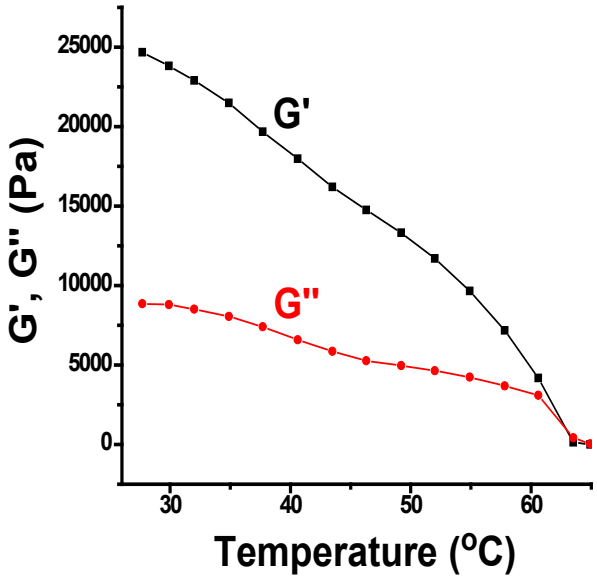

Fig. S3 Modulus-temperature trace of CdTe QDs nanofluid synthesized at 50 °C. (G' is the dynamical storage modulus, and G" is loss modulus)

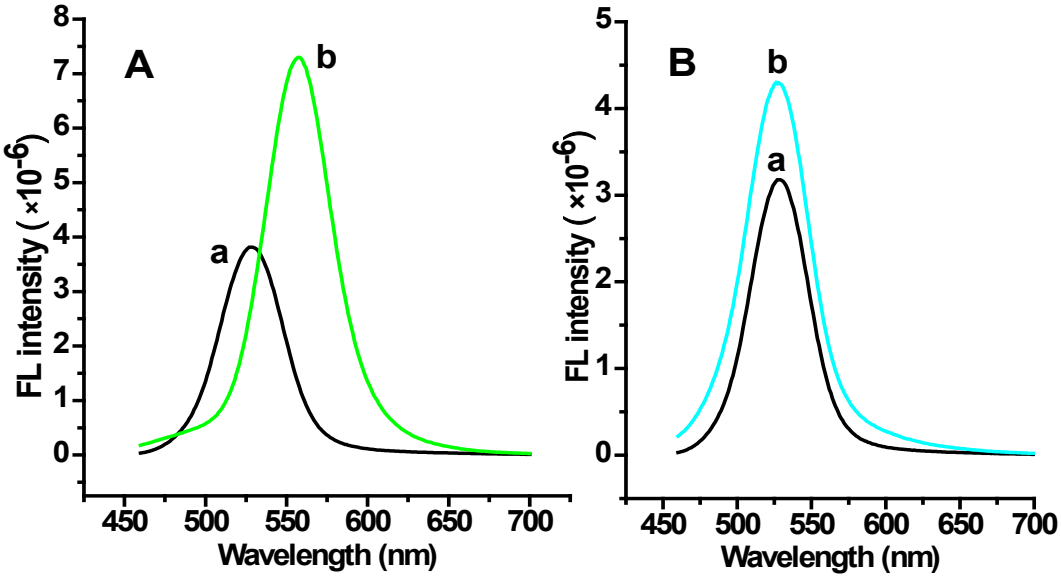

Fig. S4 Fluorescence spectra measured in solutions of A) (a) MPA-QDs, (b) PEG-TA-QDs prepared at 50 °C; B) (a) MPA-QDs and (b) PEG-TA-QDs prepared under room temperature (30 °C).

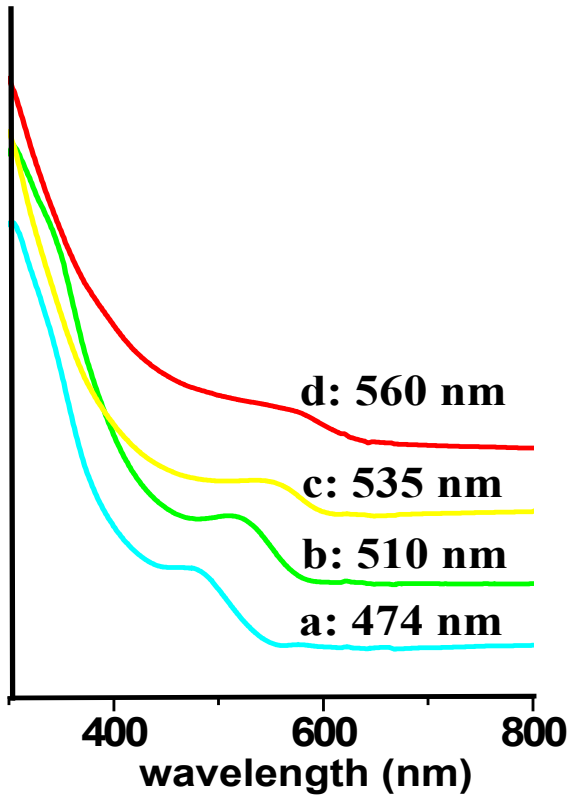

Fig. S5 Corresponding UV-vis spectrum of PEG-TA capped CdTe QDs with absorption peaks of a): 474 nm; b): 510 nm; c): 535 nm; d): 560 nm.

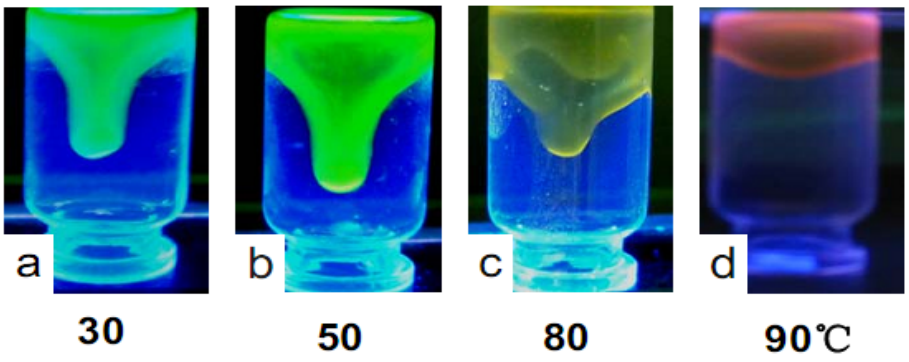

Fig. S6 Liquid-like behavior of different emission of CdTe QDs nanofluids under uviol lamp: a) green (527 nm), prepared at room temperature about 30 °C, b) Kelly (558 nm), prepared at 50 °C, c) orange (579 nm), prepared at 80 °C, and d) red (600 nm), prepared at 90 °C.

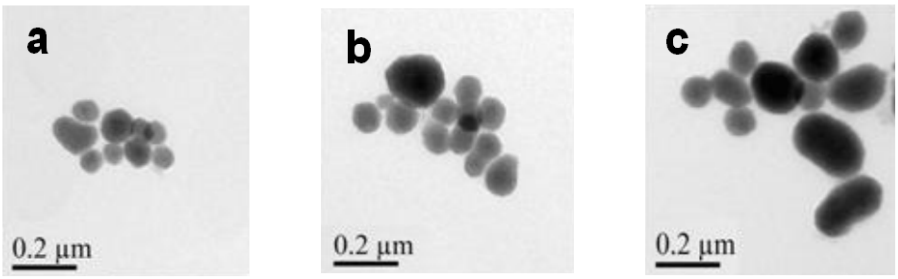

Fig. S7 TEM images of CdTe QDs nanofluids prepared at different temperature: a) 50 °C; b) 80 °C; c) 90 °C with average particle sizes of 80 nm, 100 nm, and 150 nm, respectively.