Water-Dispersed Quantum Dots of Coordination Polymers with Strong Photoluminescence

Support information

Experiment details

Materials and Instruments: All of reagents and solvents were purchased from Beijing Chemical Reagent Corporation, China, Alfa Aesar or Aldrich Corp. and were utilized as received unless indicated otherwise. A498 was purchased from cell culture center of Institute of Basic Medical Sciences, CAMS and cultured in Dulbecco's Modified Eagle's Medium，High Glucose(DMEM) supplemented with 10% neonatal bovine serum(NBS). Fetal bovine serum was purchased from Sijiqing Biological Engineering Materials (Hangzhou, China). Liquid cell culture medium was purchased from HyClone/Thermofisher (Beijing, China). Cell cultural consumables were purchased from Nunc (HuameiBio, Beijing). UV–vis spectra were taken on a Hitachi U-3010 spectrometer, and fluorescence spectra (FL) were measured on a Hitachi F-4500 spectrofluorometer. Transmission electron microscopy (TEM) measurements were conducted with JEOL 2010 transmission electron microscopes using an accelerating rate voltage of 200 KeV. The XRD patterns are recorded with a Japan Rigaku D/max-2500 rotation anode x-ray diffractometer equipped with graohite-monochromatized Cu K_α radiation (λ = 1.54178 Å). The quantum yields were measured by comparison against perylene diimides as the standard, whose is known to have a quantum yield of 1.[10]

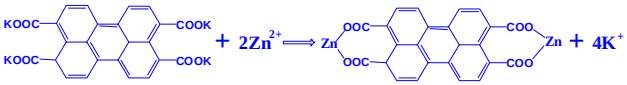
Cell Culture. A498 cells were routinely cultured in DMEM (high glucose) medium containing 10% FBS and harvested for subculture using trypsin (0.05%, Gibco/Invitrogen) and grown in a humidified atmosphere containing 5% CO_2 and 95% air at 37℃. Before experiment, the cells were pre-cultured until confluence was reached.

PZn QDs/NPs for cell imaging. 10 μL of PZn QDs/NPs (0.1 mg/mL) was added into 1 mL of DMEM medium containing A498 cells in 35 mm plate. The plate was incubated for 12 h at 37 °C. The medium was removed, and the cells were washed with phosphate buffered saline (PBS, pH 7.4) twice. Fluorescence images were recorded on fluorescence microscopy (Olympus 1X71) using a 455/70 nm excitation filter with 500 ms exposure time.

Assay for photostability. The solution containing PZn QDs/NPs/ FITC was dropped on a glass plate, and the sample was continuously irradiated by a mercury lamp (100 W) with a 455/70 nm excitation filter. Fluorescent intensities of samples were recorded with fluorescence microscopy (Olympus 1X71).

Synthesis of PZn QDs and NPs. Scheme 1 shows the reaction of PK and $Zn(OAc)_2•H_2O$ for producing PZn. 58.2 mg 3,4,9,10-perylenetetracarboxylic potassium（PK）was dispersed in 50 mL methanol, and the colloid was mixed with 56 mg KOH in 50 mL methanol solution. The mixture is heated to 60 °C. And then, the resulting mixture was added to methanol containing $Zn(OAc)_2•H_2O$ (40.2 mg, 10 mL) to reflux and stir for 12 hours. The product was cooled to room temperature, and the yellow precipitate was collected by centrifugation and washed several times with water and methanol. The powder was obtained after the precipitate was dried at vacuum 40 °C for 2 hours, which can be redispersed in organic solvents (methanol, ethanol, acetone, DMF, and DMSO et al.) and water. Decreasing the mass of KOH to 28 mg in 30 mL methanol solution, PZn NPs were prepared. The powder was used for XRD measurement. For the measurements of UV-vis and FL spectra, the 1 mg powder as-prepared was redispersed in 10 mL water. To investigate their

morphologies, the as-prepared powder was redispersed in ethanol and characterized by TEM and HRTEM.



Scheme S1 Reaction of PK with Zn(OAc)2 to synthesize PZn

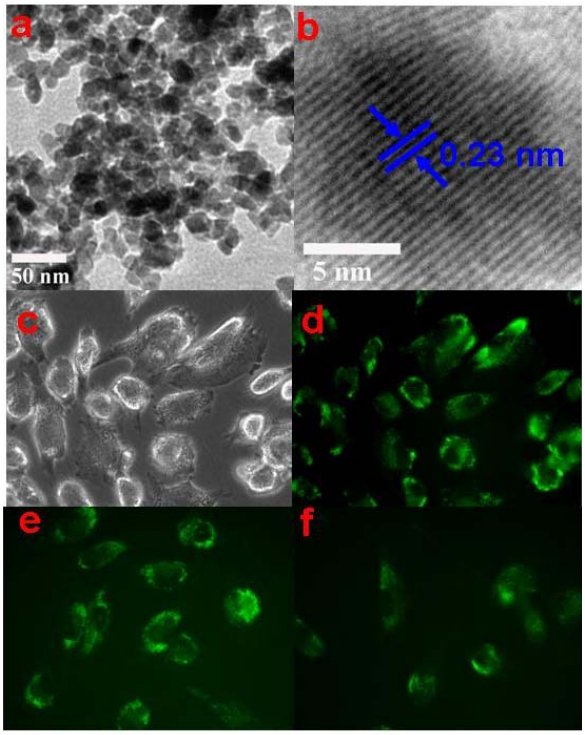


Figure S1 a) TEM image and b) HRTEM image of PZn NPs. c-e) Phase contrast and fluorescence microscopy images of PZn NPs for cell image. f) High magnification PZn QDs for cell image.