

Glutathione-Functionalized Mn:ZnS/ZnO core/shell quantum dots as potential time-resolved FRET bioprobes

Dong Zhu,^{*a} Wei Li^{*a}, Li Ma^a and Yu Lei^a

College of Pharmacy, Nanjing University of Chinese Medicine, Nanjing 210046, People's Republic of China

*Corresponding author. E-mail: dongzhunjutcm@hotmail.com; liwaii@126.com.

Tel: +86 25 85811839. Fax: +86 25 85811839

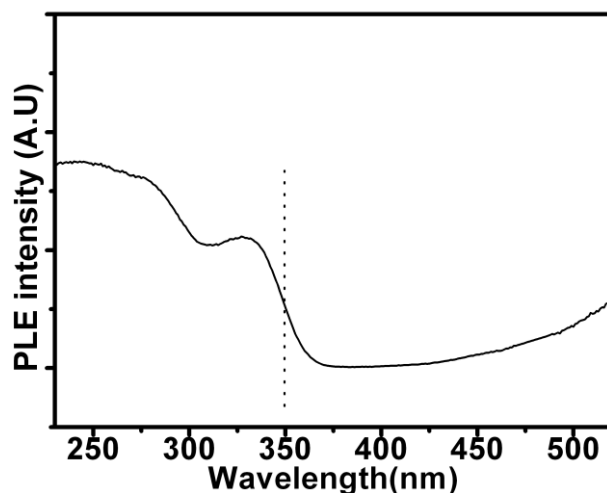


Figure S1. Excitation spectra of the Mn²⁺ emission (585 nm) at room temperature.

Determination of Photoluminescence (PL) Quantum Yield (QY). The room-temperature PL QY of the Mn:ZnS/ZnO QDs was estimated following the reference S1 by using quinine sulfate (QY = 55%, in 0.5-M H₂SO₄)^{S2,S3} as a reference standard. All the samples are excited at 325 nm wavelength.

$$QY(QDs) = (Slope_{QDs} / Slope_{ref}) (n_{QDs}^2 / n_{ref}^2) QY(ref)$$

QDs=the Mn:ZnS/ZnO QDs , REF=Reference, η =refractive index of a solvent

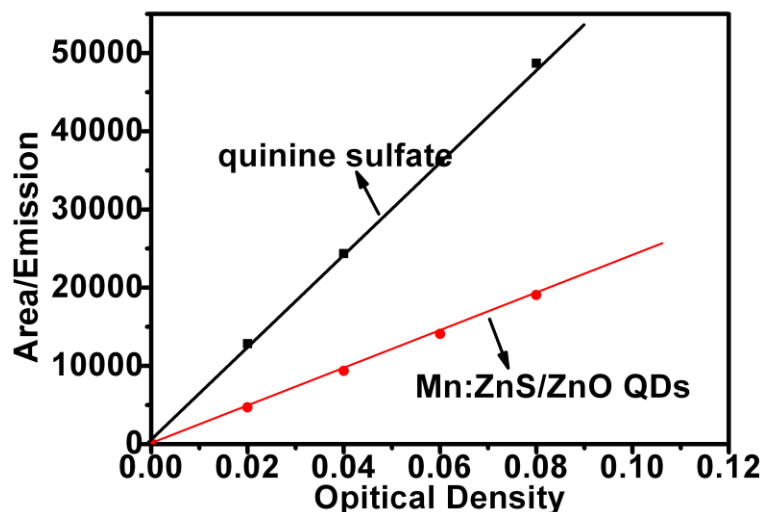


Figure S2. Determination of PL QY for the Mn:ZnS/ZnO QDs

Figure S3 exhibited biotin absorption spectrum, and a small peak at 209 nm was attributed to biotin specific absorption. The amount of loaded biotin for the QDs was determined by a UV-vis spectrophotometer at 209 nm. The yield of the biotin-QDs coupling was calculated by the following equations:

$$\text{Coupling yield(\%)} = 1 - \frac{\text{Amount of free nonconjugated biotin removed by ultrafiltration}}{\text{Initial amount of biotin}} \times 100\%$$

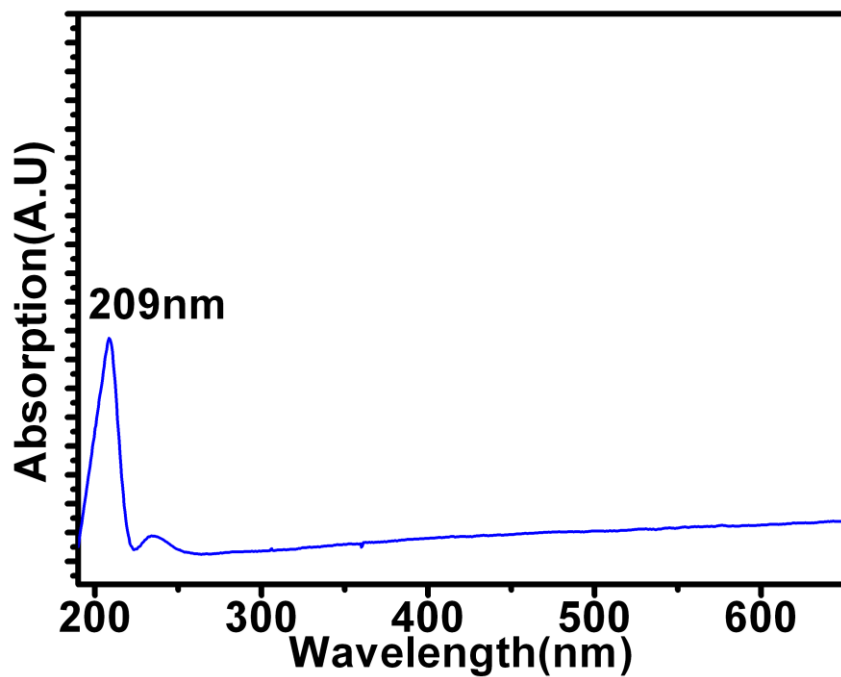


Figure S3 Uv-Vis spectrum of biotin.

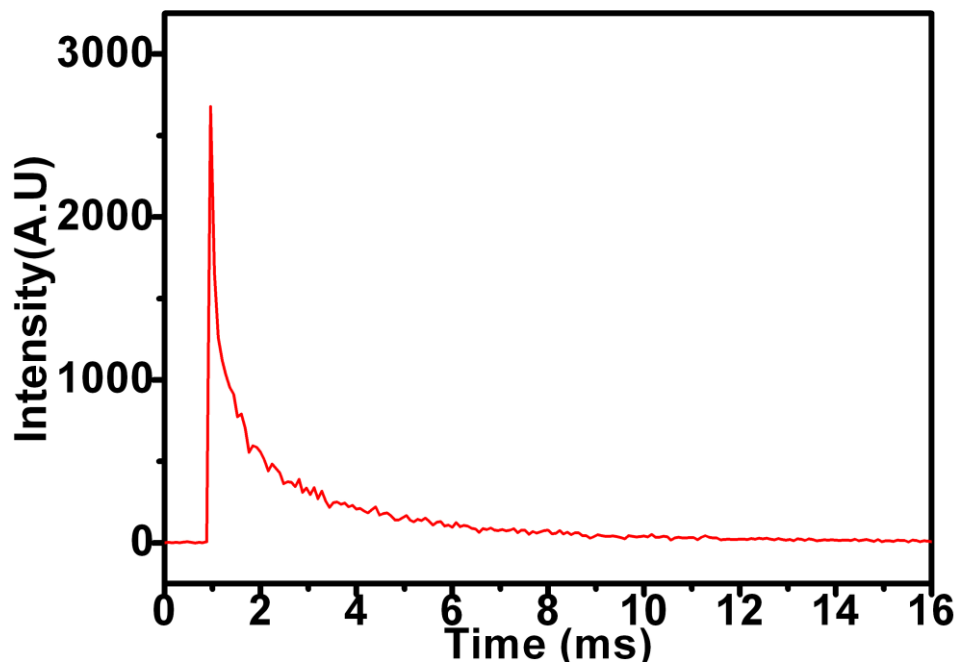


Figure S4 Photoluminescence decay of Mn:ZnS/ZnO core/shell QDs at the emission of 585 nm dispersed in PBS solution, pH7.4.

- S1. (a) IUPAC, Reference materials for fluorescence measurement, *Pure & Appl. Chem.* 1988, vol 60, No,7, pp. 1107-1114; (b) J. N. Demas and G. A. Crosby, *J. Phys. Chem.* 1971, 75, 991.
- S2. W. H. Melhuish, *J. Phys. Chem.*, 1961, **65**, 229-235.
- S3. M. Grabolle, M. Spieles, V. Lesnyak, N. Gaponik, A. Eychmüller and U. Resch-Genger, *Anal. Chem.*, 2009, **81**, 6285-6294.