Supporting information

**Fig. S1** SEM image of the modified TBADN NPs.

**Fig. S2** Photostability comparison of the TBADN NPs and modified NPs (the samples are continuously irradiated by 450 W xenon lamp).
**Fig. S3** Confocal images of CdSe/ZnS QDs (a) and TBADN NPs (b) control group(c) under same excitation 405 nm 6% laser power.

It is estimated that density of NPs is approximately the same with that of water \( (\rho = 1.0 \text{ g/mL}) \), due to the fact that NPs can suspend in water. Diameter of NP is about \( D = 100 \text{ nm} \), \( r = 50 \text{ nm} \) and molecular weight of TBADN \( M = 486 \text{ g/mol} \). Thus

Volume of a single NP: \( V = \frac{4}{3}\pi r^3 = 5 \times 10^{-16} \text{ m}^3 \).

Molecular weight of TBADN: \( m_0 = \frac{M}{N_A} = 8 \times 10^{-22} \text{ g} \).

A single NP weight: \( m = \rho V = \frac{4}{3}\pi r^3 \rho = 1.8 \times 10^{-16} \text{ g} \).

Molecular numbers in one NP: \( N = \frac{m}{m_0} = 0.7 \times 10^6 \).

The molar absorptivity of NPs can be calculated by measurement of absorptions of different concentrations of TBADN \( \varepsilon = 0.77 \times 10^4 \text{ M}^{-1}\text{cm}^{-1} \).

Fluorescence quantum yield of TBADN \( \eta = 15\% \).

Fluorescence intensity per NP \( I_{\text{NP}} = K \times (\varepsilon \times N \times \eta) = 7.7 \times 10^8 \text{ K} \).

For the blue emitting CdSe@ZnS QDs,

Fluorescence quantum yield \( \eta = 90 \sim 100\% \).

Molar absorptivity \( \varepsilon = 10^6 \text{ M}^{-1}\text{cm}^{-1} \).

Fluorescence Intensity per QD \( I_{\text{QD}} = K \times (\varepsilon \times N \times \eta) = 10^6 \text{ K} \).

It can be seen that the brightness of each TBADN NP is about 800 times higher than that of each CdSe@ZnS QDs If particle size is considered as well, TBADN NPs show comparable, if not higher, brightness with CdSe@ZnS QDs, which is well consistent with the confocal images.
**Fig. S4** (a) UV-vis absorbance spectra of free FA, C18PMH-PEG, and C18PMH-PEG-FA. (b) Surface charge of TBADN NPs, functionalized TBADN NPs and C18PMH-PEG-FA (dispersed in water, 0.012 mg/mL). We found that the mean ζ potential were -27.33 ± 1.29 mV, -10.90 ± 0.69 mV, and -8.94 ± 0.91 mV for the TBADN NPs, FA-TBADN NPs and C18PMH-PEG-FA respectively.