Electronic Supplementary Material (ESI) for RSC Advances.

Amphiphilic Silane Modified Multifunctional Nanoparticles for Ratiometric Oxygen Sensing

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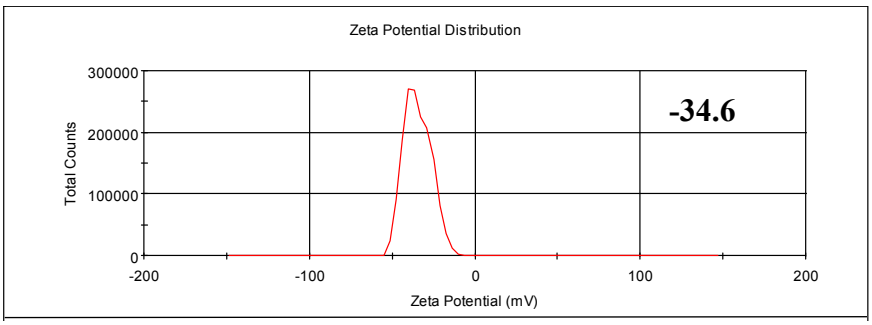

Fig. S1 The Zeta potential of Fe_3O_4@PtTFPP/C6@silane (-34.6).

The zeta potential of Fe_3O_4@PtTFPP/C6@silane NPs is -34.6, as shown in Fig. S1, which indicates the highly solubility in water and the stability of the prepared NPs.

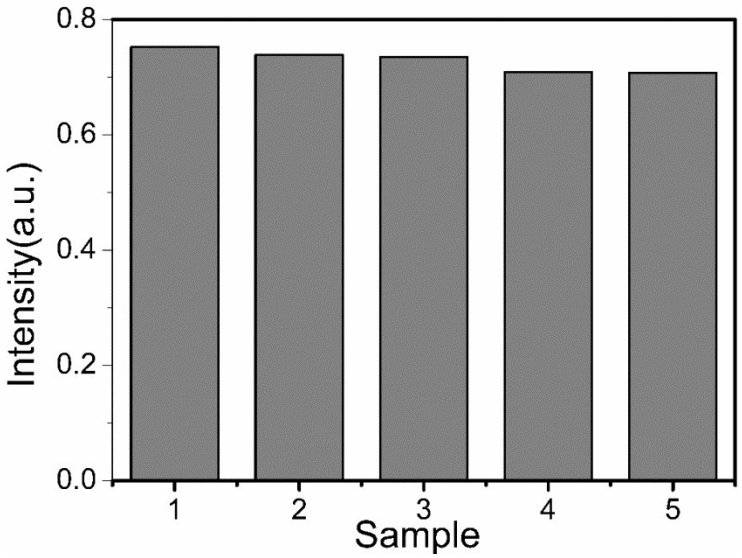

Fig. S2 Multiple sensors were used to detection of dissolved oxygen, and the intensity of emission spectrum were normalized.

We conducted multiple sensor experiments with five parallel experiments. The figure showed similar fluorescence signal intensity and calculated standard deviation is 0.017679.

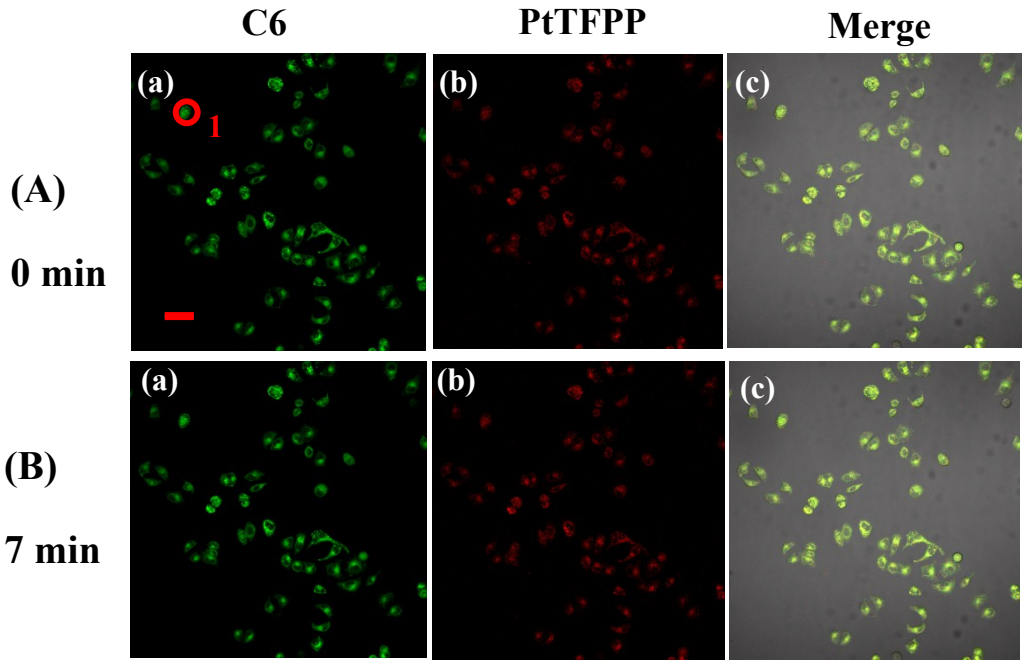

Fig. S3 CLSM images of MCF-7 cells treated with Fe_3O_4@C6/PtTFPP@silane NPs. The green (C6) and red (PtTFPP) fluorescence were, respectively, collected at 475–550 and 620–680 nm with a 458 nm excitation wavelength. The group (A) presented fluorescence images before adding glucose oxidase. The group (B) showed fluorescence images after adding glucose oxidase (1.4mg/ml, 50μl) for 7 minutes. Range 1 is circled to record the intensity. The images are fake color. The scale bar is 100 μm

To investigate the *in vitro* hypoxic response of Fe_3O_4@PtTFPP/C6@silane NPs, the MCF-7cells were incubated with NPs (40 μg/mL) for 24 h. Before oxygen sensing, glucose (8mM, 100μL) was pumped into the sealed confocal dish. The initial DO concentration was measured by the green and red emission signal. Then glucose oxidase (1.4mg/mL, 50μL) was added into the dish rapidly. The signal from both channels were monitored and the ratiometric gray intensity of the same point on the images were calculated. The images were captured every 10 seconds in 12 minutes after the introduction of oxidase. As Fig. S3 shows, after 7 minutes, the red emission intensity had an increase compared with 0 minute.

Besides, the cell movement experiments under the CLSM was also carried using bright-field channel, and the moving process was monitored as a video.