

Supplementary Information: *Journal of Materials Chemistry*

Title: Hybrid Silica Nanoparticles Traceable by Fluorescence and FT-IR Spectroscopy: Preparation, Characterization, and Preliminary Biological Studies

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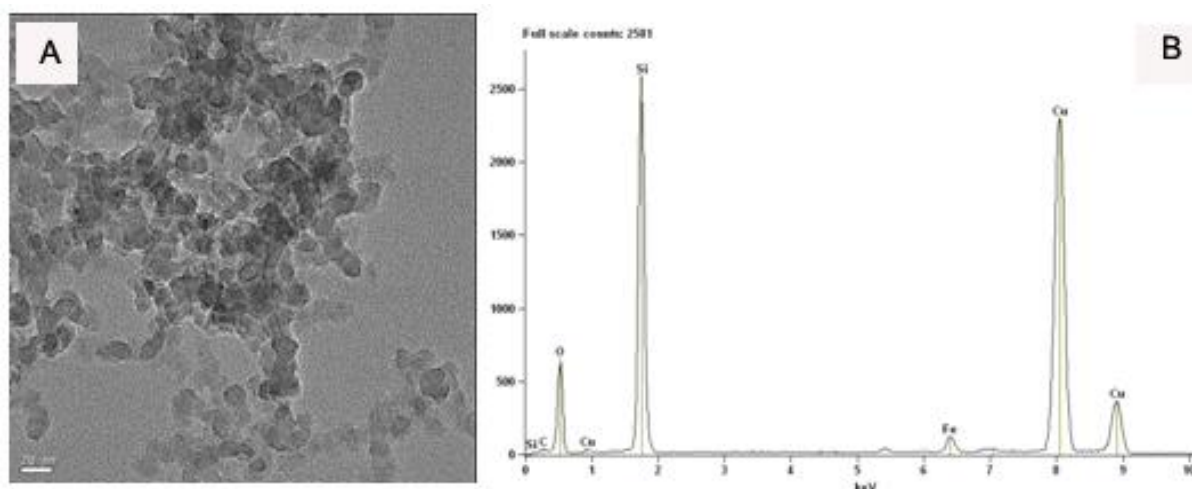


Figure S1. HR-TEM EDC analysis data of SiO₂@DIT-tag₆₀ NPs

<i>Element Line</i>	<i>Weight %</i>	<i>Weight % Error</i>	<i>Atom %</i>
<i>C K</i>	7.58	+/- 0.83	13.73
<i>O K</i>	28.06	+/- 0.68	38.17
<i>Si K</i>	59.73	+/- 0.43	46.29
<i>Fe K</i>	4.64	+/- 0.27	1.81

Table S1. EDC analysis data of SiO₂@DIT-tag₆₀ NPs

	Atomic concentration %				
	Fe 2p 3/2	N 1s	C 1s	Si 2p	Si/Fe
SiO ₂ @DIT-tag ₂₀ NPs	0.24	1.06	48.71	49.99	208.29
SiO ₂ @DIT-tag ₆₀ NPs	1.14	3.24	39.88	55.74	48.89

Table S2. Quantification report of an XPS analysis on SiO₂@DIT-tag_{20/60} NPs

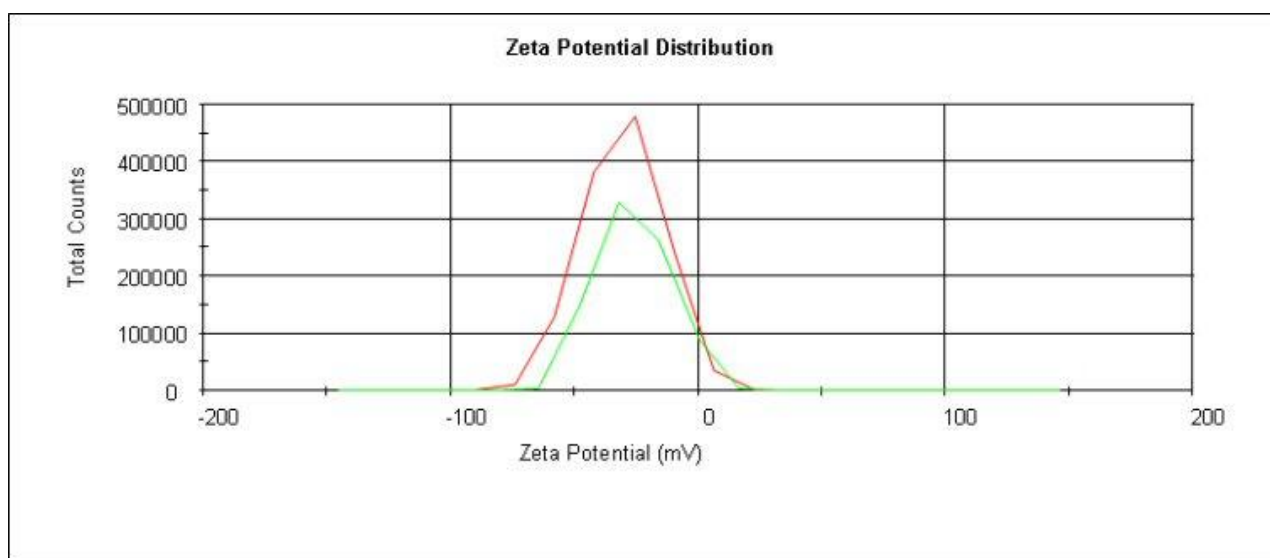


Figure S2. ξ potential distributions of SiO₂@DIT-tag_{20/60} NPs (1 mg NPs/mL of EtOH) are -30.1 mV (*red curve*) and -26.1 mV (*green curve*), respectively.

	Atomic concentration %				
	Fe 2p 3/2	N 1s	C 1s	Si 2p	Si/Fe
SiO ₂ @DIT-tag ₂₀ @FITC NPs	0.83	1.81	57.88	39.48	47.57

Table S3. Quantification report of an XPS analysis of SiO₂@DIT-tag₂₀@FITC NPs

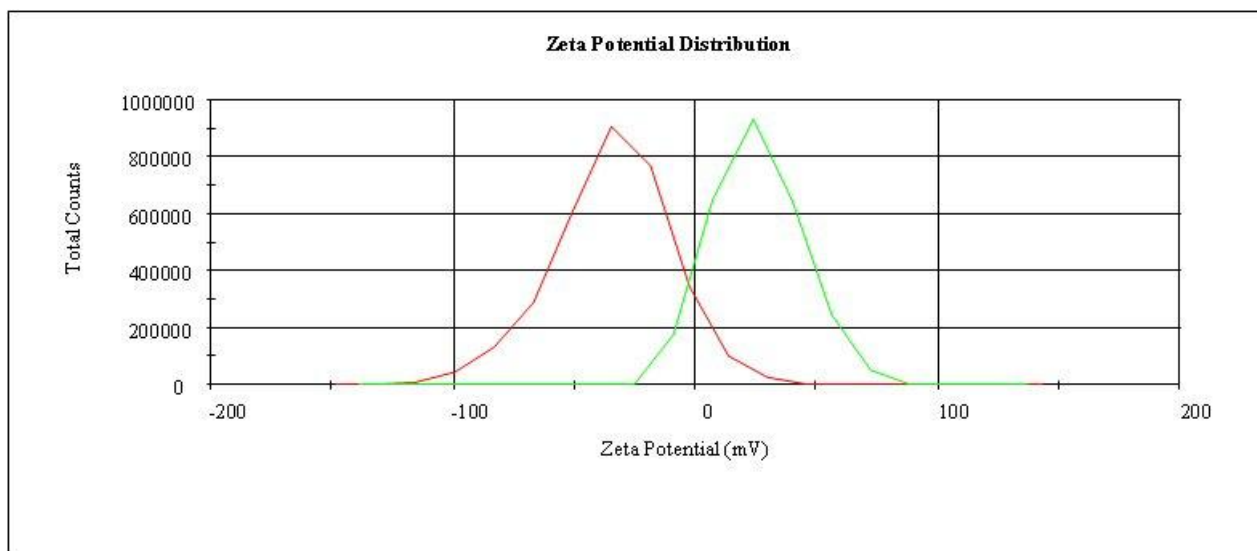


Figure S3. ζ potential distributions of SiO_2 @DIT-tag@FITC NPs (1.0 mg NPs/mL EtOH, red curve, -34.0 mV) and of SiO_2 @DIT-tag@FITC@ NH_2 NPs (1.0 mg NPs/mL EtOH, green curve, +25.6 mV)

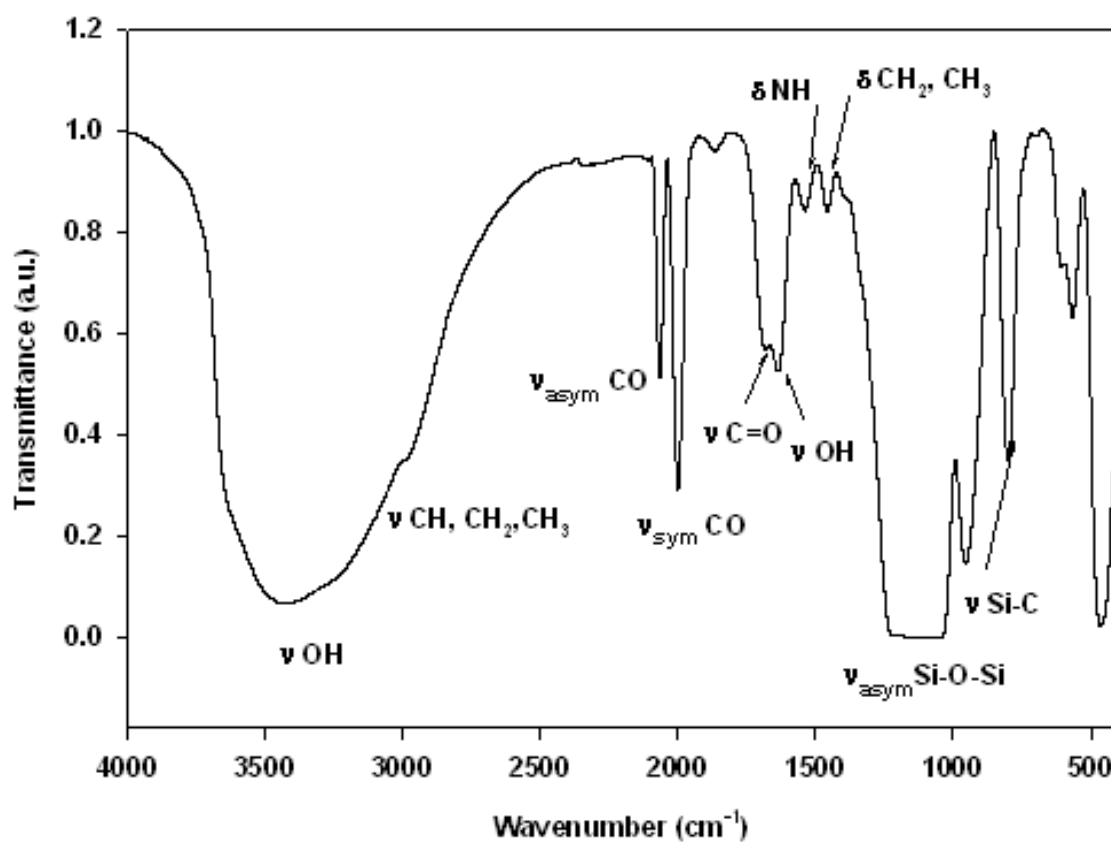


Figure S4. FT-IR spectrum and the main vibrational bands of SiO_2 @DIT-tag@FITC NPs

<i>Element Line</i>	<i>Atom %</i>	<i>Atom % Error</i>
<i>C K</i>	5.65	+/- 0.49
<i>O K</i>	75.25	+/- 0.54
<i>Si K</i>	18.88	+/- 0.09
<i>Fe K</i>	0.22	+/- 0.03
<i>Total</i>	100.00	

Table S4. HR-SEM EDAX analysis data of SiO₂@DIT-tag₂₀@FITC@NH₂ NPs

<i>Element Line</i>	<i>Atom %</i>
<i>O K</i>	65.28
<i>Si K</i>	34.08
<i>Cl K</i>	0.14
<i>Fe K</i>	0.51
<i>Total</i>	100.00

Table S5. HR-TEM EDC analysis data of SiO₂@DIT-tag₂₀@FITC@NH₂ NPs

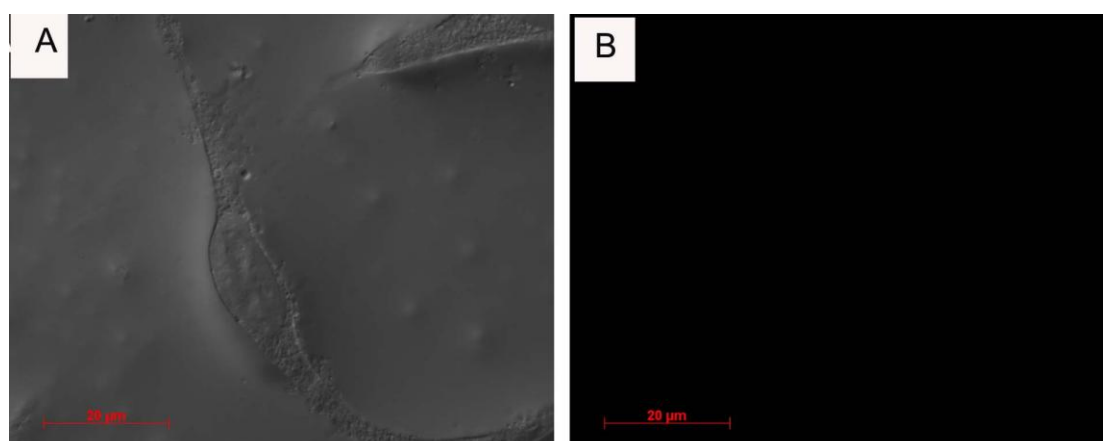


Figure S5. Fluorescence (A) and DIC photomicrographs (B) of the negative control of B16 cells (*without* NPs)

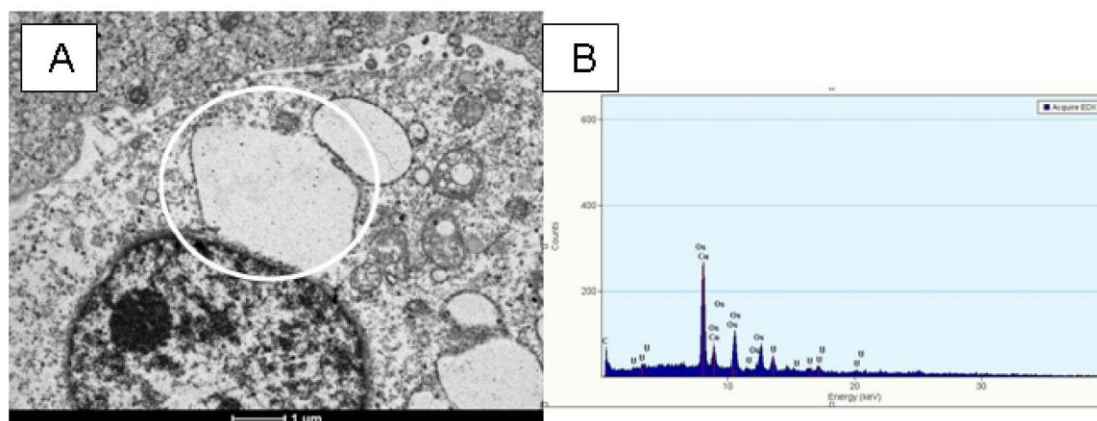


Figure S6. A: TEM photomicrograph of negative control B16 cells (*without* NPs). The white circle depicts the area upon which the EDS analysis was acquired from vacuoles; B: EDS spectrum demonstrated only elements that were used in cell fixation (Os) and staining (U)

Entry	FT-IR Absorbance $\nu_{\text{FeC}\equiv\text{O}}$ [2063.3 & 1996.5 cm^{-1}] (a.u.)
Control 1	0.258800.15750 &
1	0.16758 0.10053 &
2	0.167580.10053 &
3	0.167580.09900 &
4	0.157230.10282 &
5	0.10086 0.06842 &
6	0.041620.03832 &
7	0.026720.02256 &
8	0.015620.01568 &
9	0.009790.01492 &
10	0.0054180.004874 &
11	0.004540.004795 &
12	0.003530.003554 &
Control 2	-

Table S6. Absorbance values (a.u.) of FT-IR sensitivity experiments

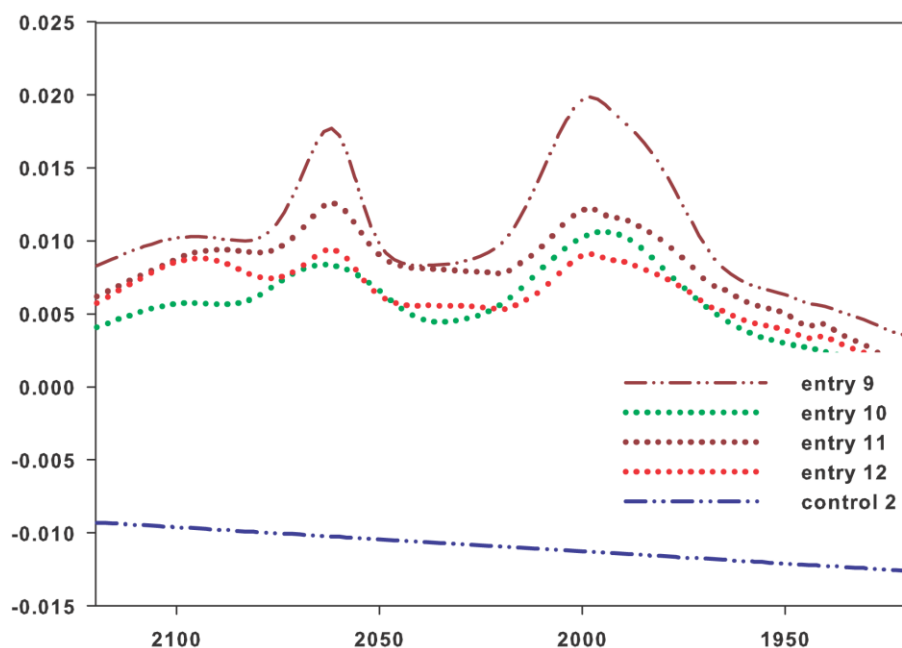


Figure S7. Magnified superimposed FT-IR signals (x 5) to entries 9-12 and Control 2 are in Table 1

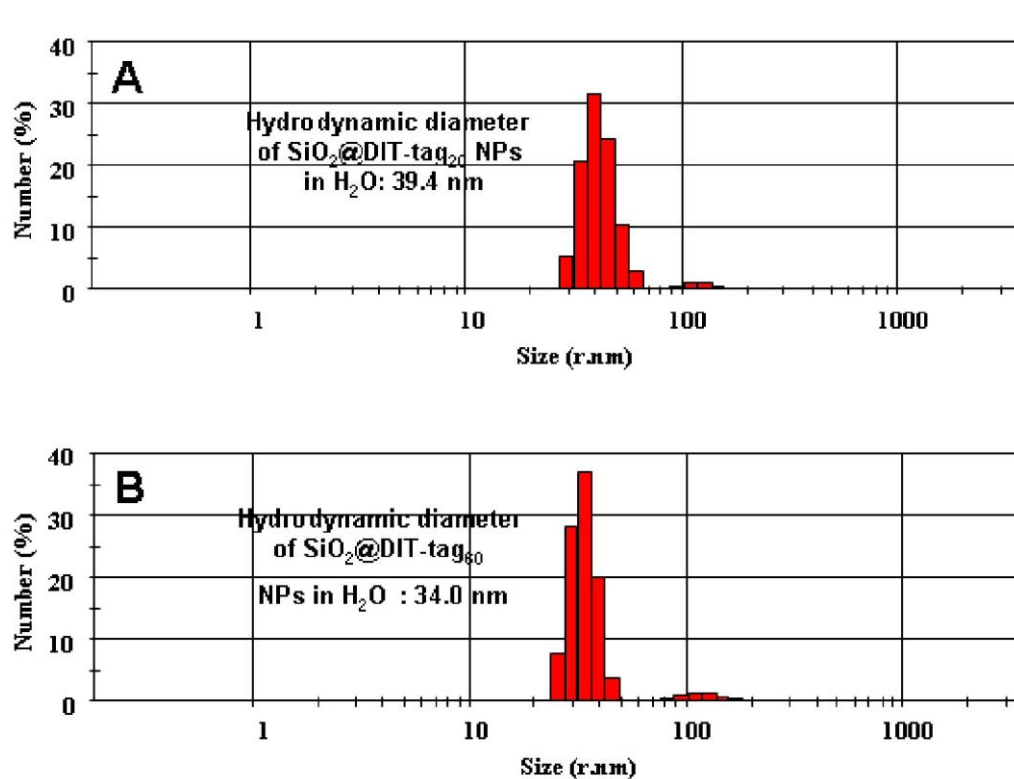


Figure S8. DLS-measured diameter histograms of SiO₂@DIT-tag₂₀ (A) and SiO₂@DIT-tag₆₀ NPs (B) in H₂O (1.0 mg NPs/mL)

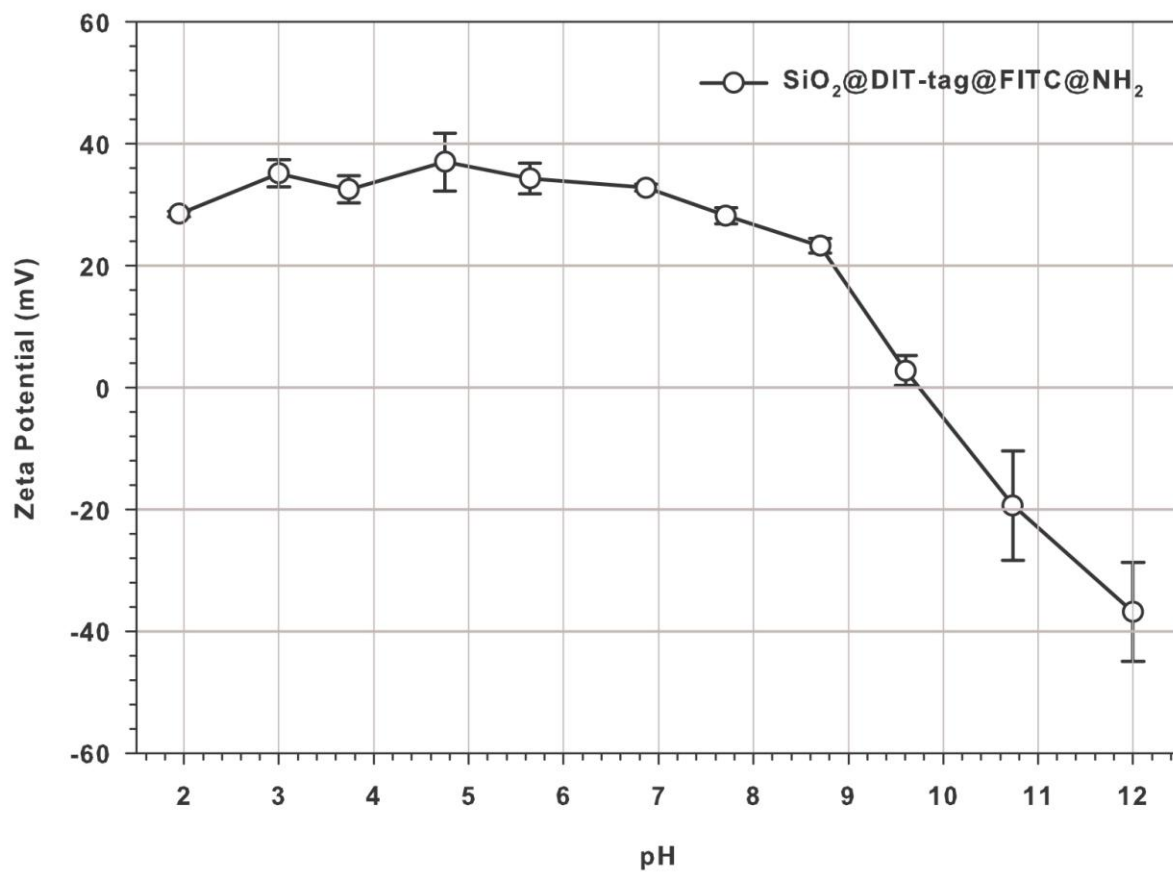


Figure S9. pH dependency of the colloidal stability of SiO₂@DIT-tag@FITC@NH₂ NPs in neutral H₂O (2.0 mg NPs/mL H₂O) - Acidic-base titration experiment

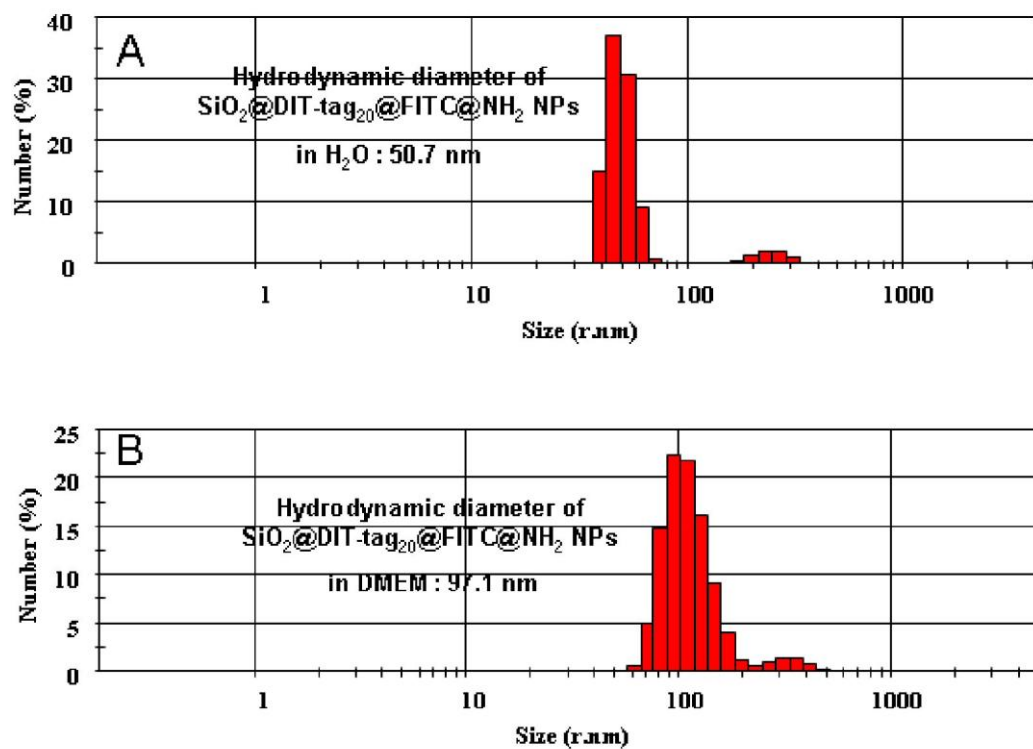


Figure S10. A & B: DLS histograms of $\text{SiO}_2@DIT\text{-tag}_{20}@FITC@NH_2$ NPs in the H_2O and DMEM containing 10% fetal bovine serum (FBS), respectively. The hydrodynamic diameter of NP in water was measured to be 50.7 nm and in DMEM 97.1 nm, respectively.