Electronic Supplementary Material (ESI) for Nanoscale

Cellular uptake, evolution, and excretion of silica nanoparticles in human cells

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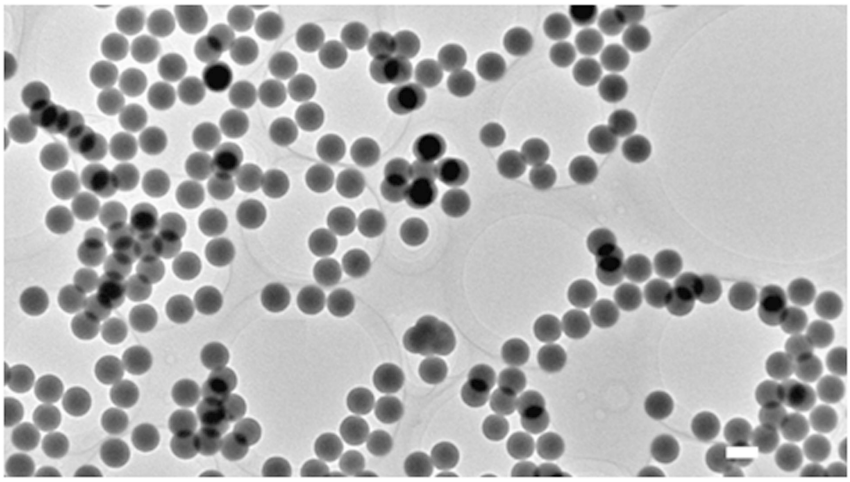

Fig. S1 TEM image of the synthesized amorphous silica NPs of ~400 nm diameter. (The scale bar is 500 nm.)

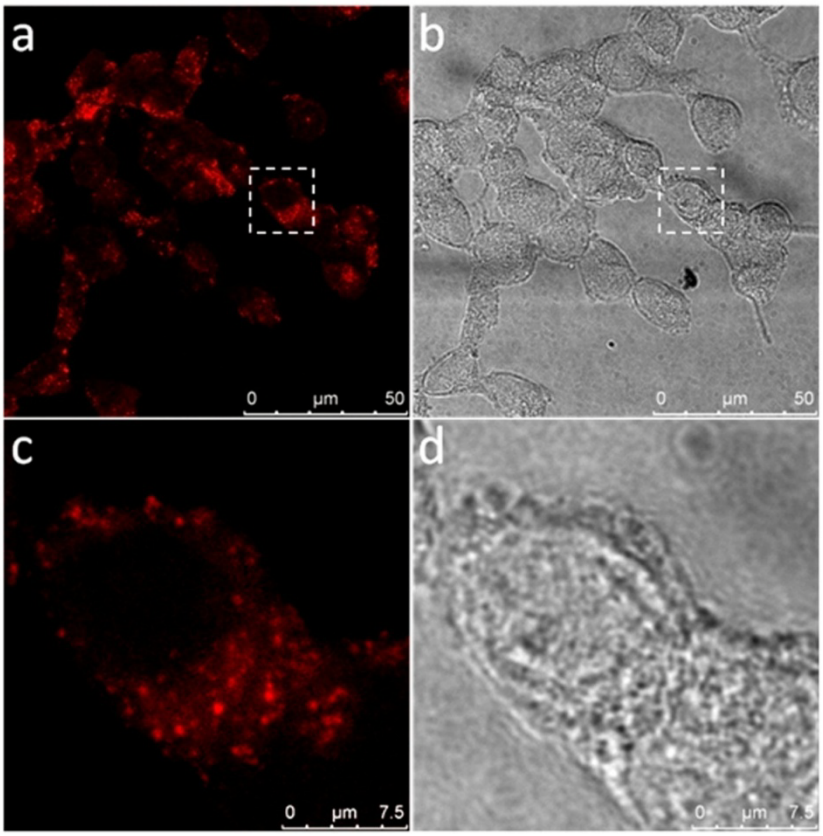

Fig. S2 Confocal microscopy images of the H1299 cells (fixed cells) treated with 50 nm fluorescent amorphous silica NPs: (a) fluorescence images of H1299 cells treated with NPs; (b) transmittance (Bright field) images of H1299 cells treated with NPs; (c) magnified images of boxed area in Fig.2a; (d) magnified images of boxed area in Fig.2b.

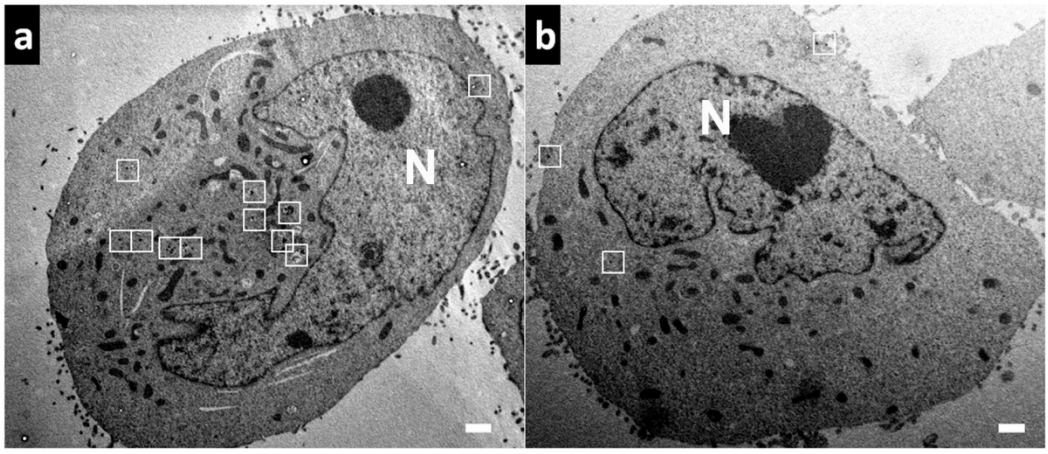

Fig. S3 TEM images showing the temperature effect on the cellular uptake of silica NPs: H1299 cells treated with 50 nm amorphous SiO_2 NPs for 3 hours (a) at 37 ^{o}C; and (b) at 4 ^{o}C. (Rectangle marked areas indicate the location of NPs. The scale bar is 500 nm; N stands for “nucleus” in the cell.)

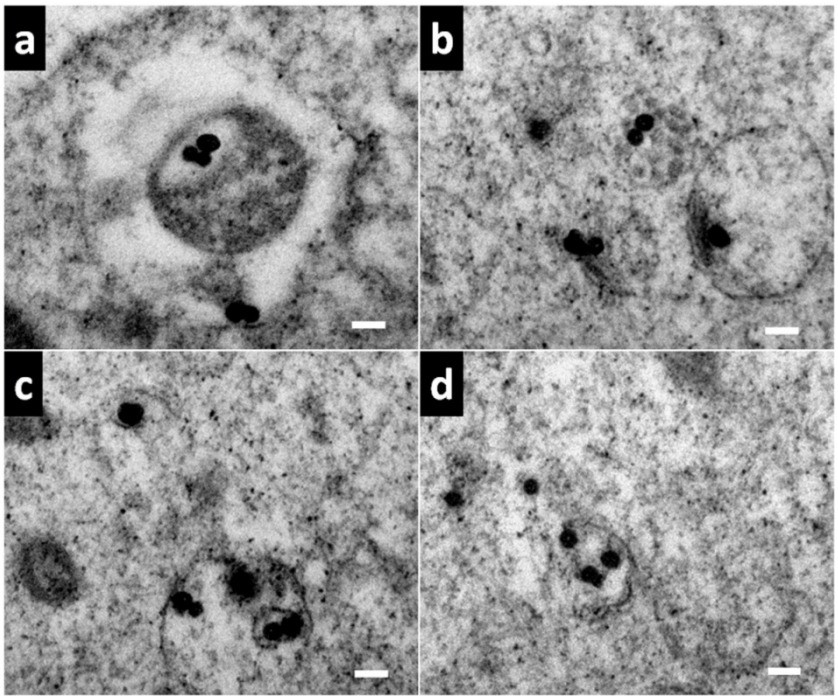

Fig. S4 TEM images depicting the morphology of the 50 nm amorphous SiO_2 NPs inside H1299 cell: (a) membrane-bound organelle containing NPs inside another organelle; (b) several organelles containing NPs; (c) NP containing organelle inside another larger organelle; (d) NPs inside a half ruptured organelle. The scale bar is 100 nm.

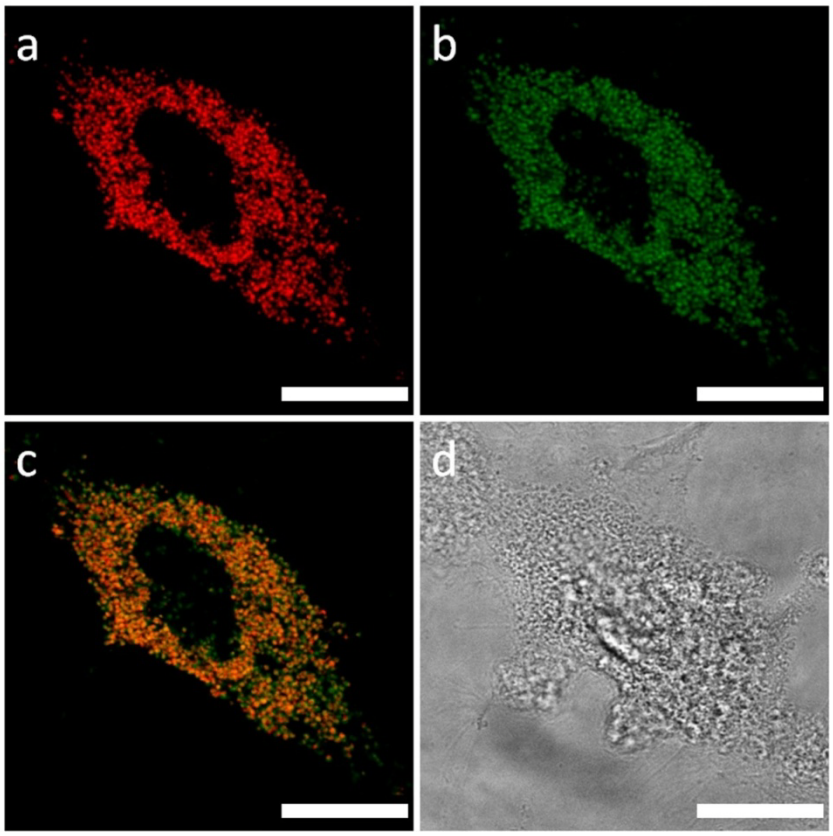

Fig. S5 Confocal microscopy images showing the localization of 50 nm fluorescent amorphous silica in H1299 cells (live cell): (a) the red fluorescence of NPs indicates the localization of NPs inside cells; (b) the green fluorescence of Lysotracker Green indicates the localization of lysosomes in cells; (c) overlapping image of a and b, the orange signal originates from the overlapping red and green florescence signals, indicating that most of the NPs are located in the lysosomes; (d) transmittance images showing the morphology of H1299 cells. The scale bar is 25 μm.

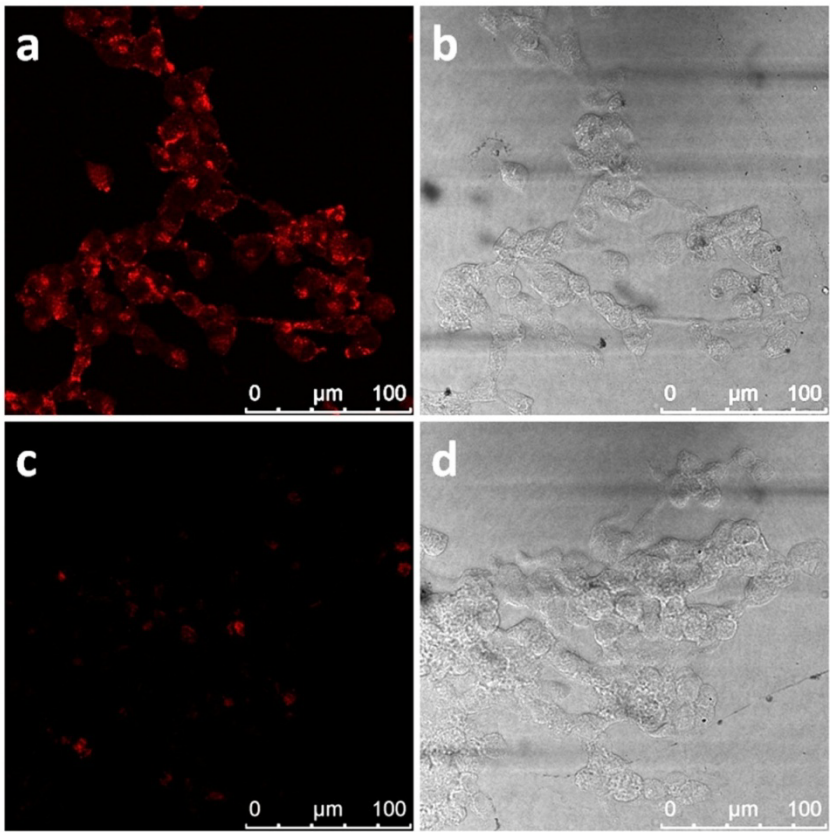

Fig. S6 Confocal microscopy images of H1299 cells (fixed cells) treated with 50 nm fluorescent amorphous silica NPs: (a) fluorescence images and (b) transmittance images of H1299 cells treated with NPs in SFM for 48h; (c) fluorescence images and (d) transmittance images of H1299 cells treated with NPs in SFM for 48h and after an additional 1 hour incubation in fresh, NP-free SFM.

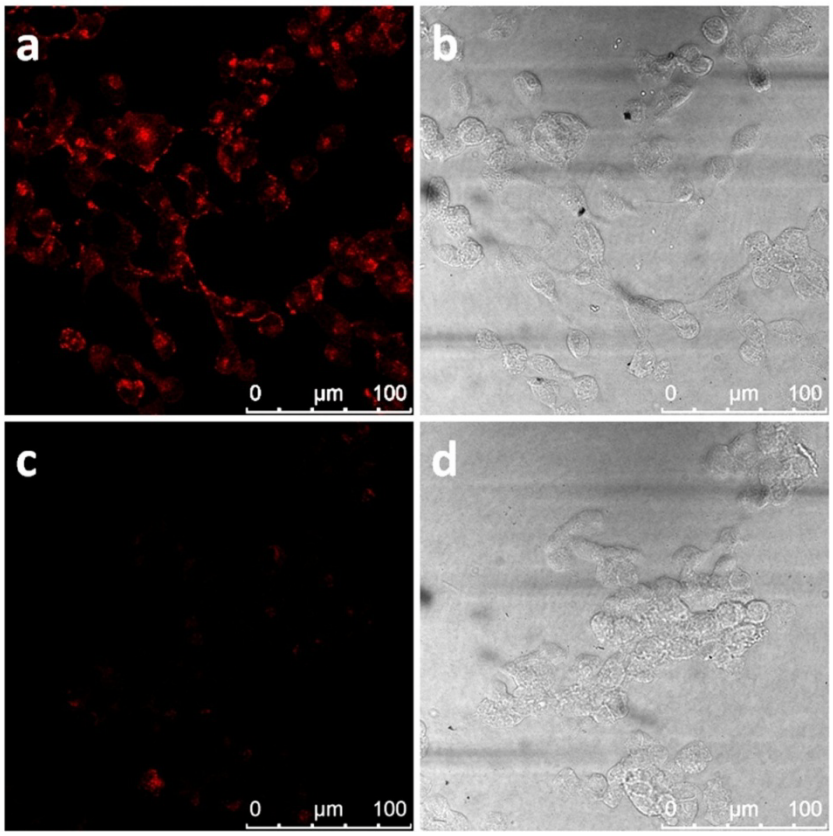

Fig. S7 Confocal microscopy images of H1299 cells (fixed cells) treated with 50 nm fluorescent amorphous silica NPs: (a) fluorescence images and (b) transmittance images of H1299 cells treated with NPs in SFM for 48h; (c) fluorescence images and (d) transmittance images of H1299 cells treated with NPs in SCM for 48h.

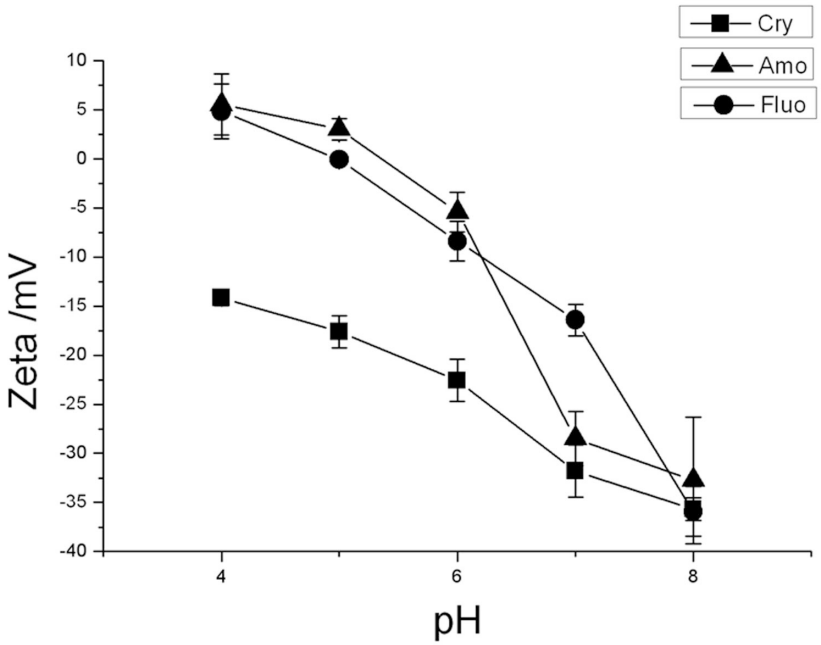

Fig. S8 Zeta potentials of 50 nm amorphous silica NPs (Amo), 50 nm fluorescent amorphous silica NPs (Fluo) and Crystalline silica NPs (Cry) at different pH values. The error bar shows the standard deviation (SD) from three independent experiments.

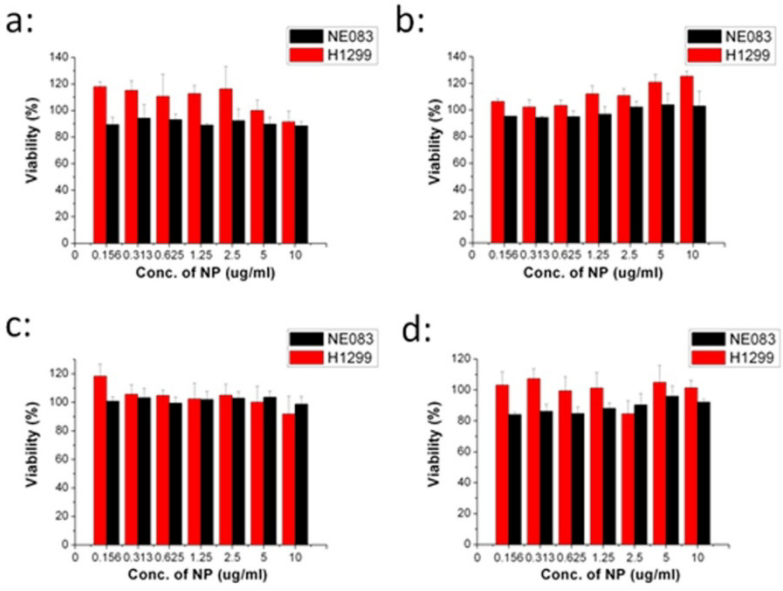

Fig. S9 Cytotoxicity of silica NPs on H1299 cell or NE083 cell after 24h or 48h incubation: 10-20 nm amorphous NPs incubated for (a), 24 hours and (b), 48 hours; 400 nm amorphous NPs incubated for (c), 24 hours and (d), 48 hours. Data are shown with mean ± standard deviation (SD) from four independent experiments. Significance indicated by $p < 0.05$, analyzed by student's t test.

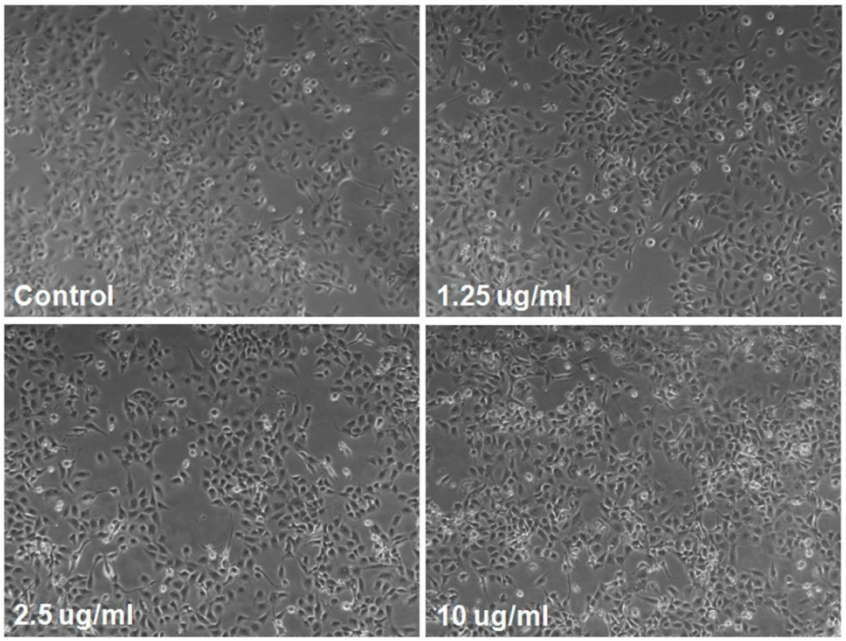

Fig. S10 Light microscopy images of H1299 cells treated with 50 nm NPs at different concentration in SFM for 48 hours.

Table. S1 Dynamic light scattering (DLS) results of 50 nm fluorescent amorphous silica NPs dispersed in PBS buffer at ~0 min., 30 mins. and 60 mins.. Concentration with 10 μg/ml is chosen for measurement.

Concentration (μg/ml)	Duration (min.)	Hydrodynamic radius (nm)
10	0	38
	30	43
	60	48