Supporting Information

NIR-excited upconversion nanoparticles used for targeted inhibition of Aβ42 monomers and disassembly of Aβ42 fibrils

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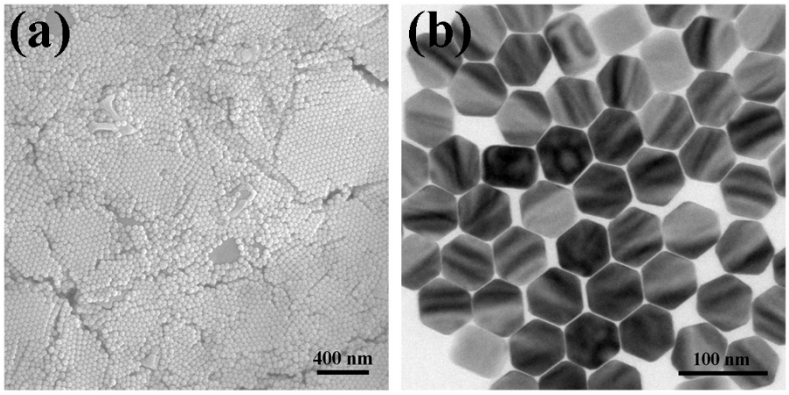

Figure S1 (a) SEM image and (b) TEM image of UCNPs.

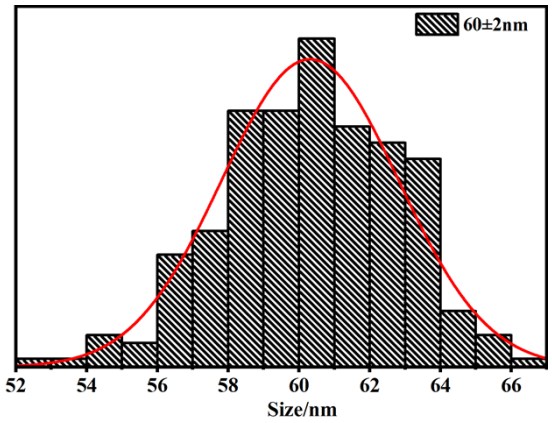

Figure S2 Particle size distribution of UCNPs.

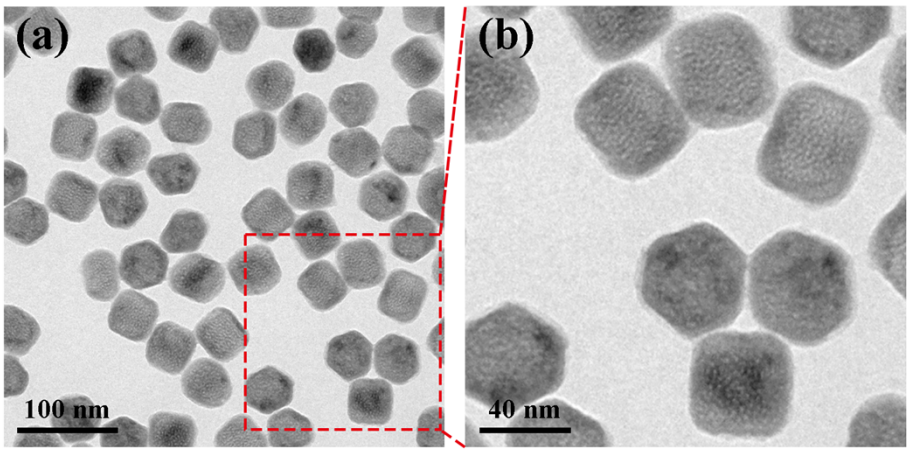

Figure S3 TEM image of UCNPs@SiO_2.

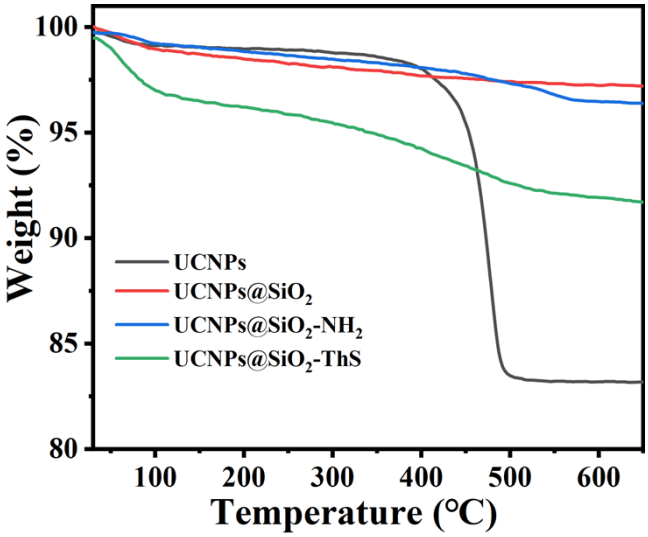

Figure S4 TGA of UCNPs, UCNPs@SiO_2, UCNPs@SiO_2-NH_2, and UCNPs@SiO_2-ThS.

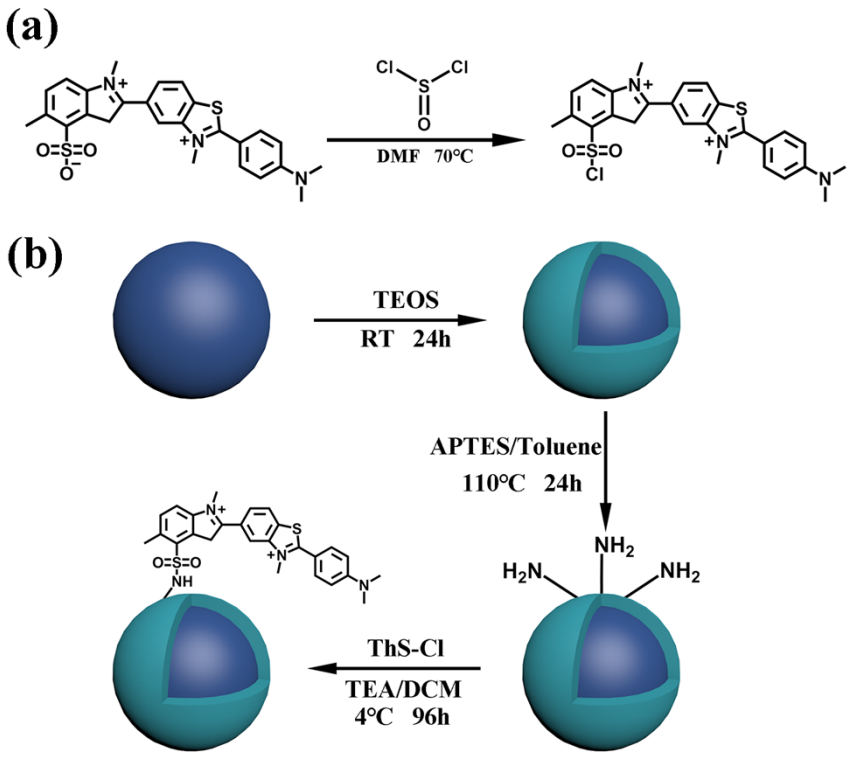

Figure S5 Synthesis of modified ThS (ThS-Cl) and functional UCNPs (UCNPs@SiO_2-ThS).

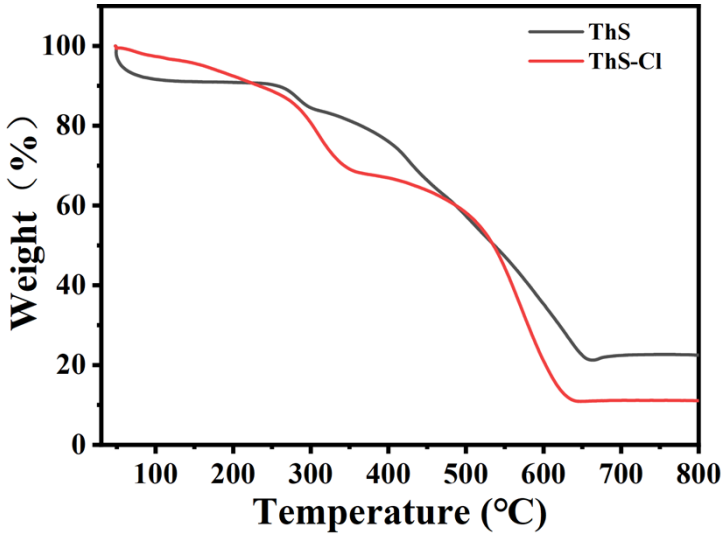

Figure S6 TGA of ThS and ThS-Cl.

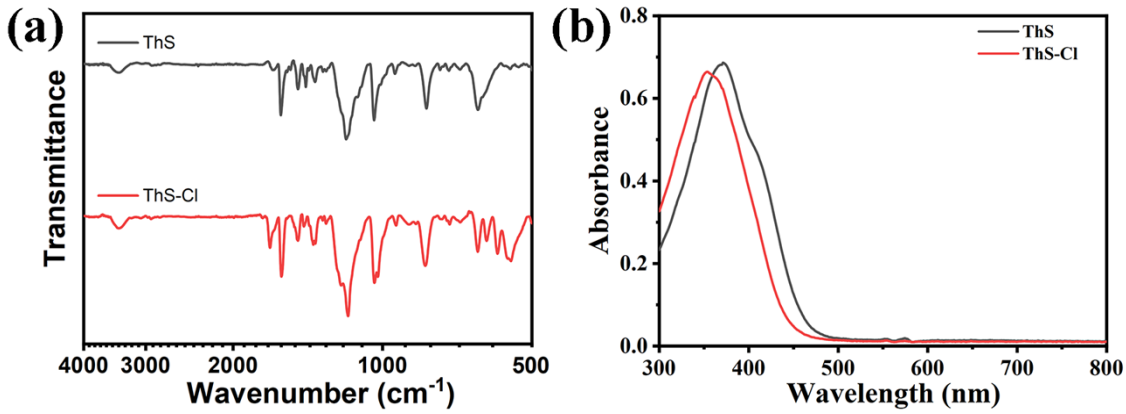

Figure S7 (a) FTIR spectra of ThS and ThS-Cl. (b) UV-vis spectra of ThS and ThS-Cl.

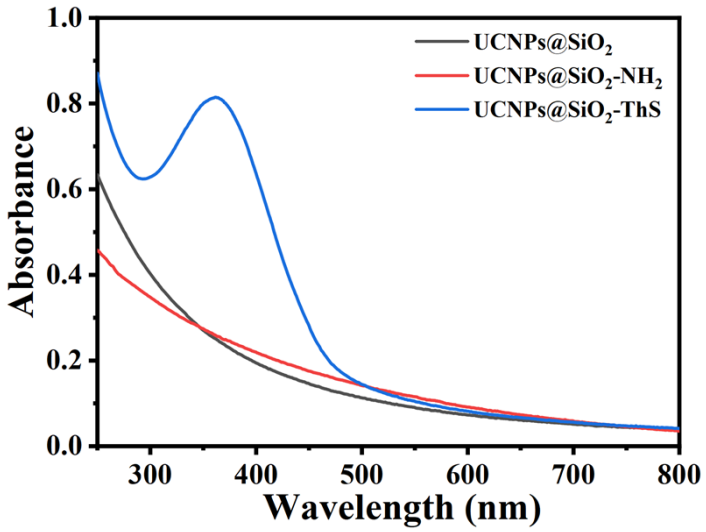

Figure S8 UV-Vis absorption spectra of UCNPs@SiO_2, UCNPs@SiO_2-NH_2, and UCNPs@SiO_2-ThS.

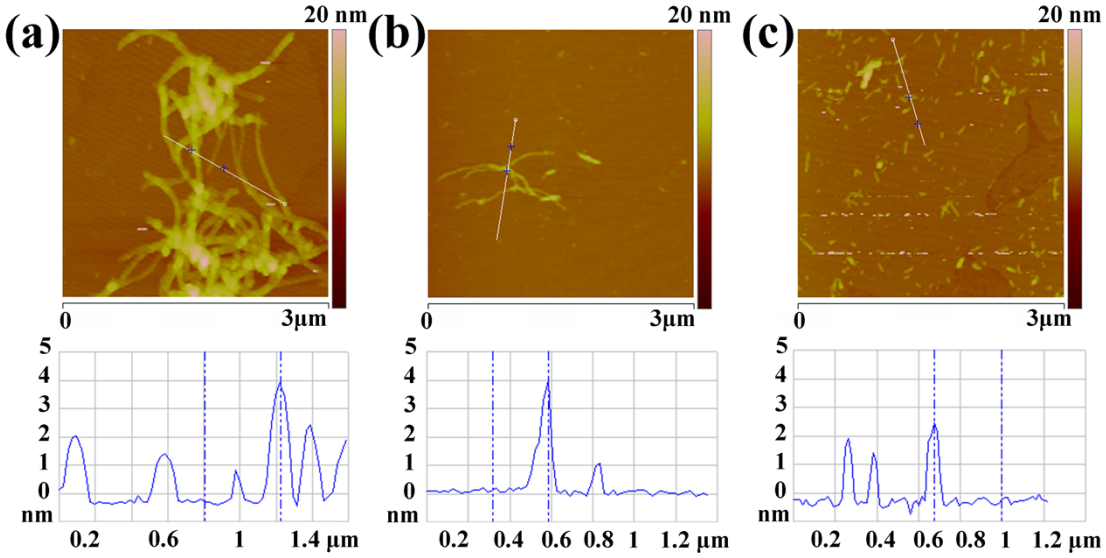

Figure S9 AFM images of (a) Aβ42 fibrils, (b) Aβ42 fibrils + UCNPs@SiO_2-ThS, (c) Aβ42 fibrils + UCNPs@SiO_2-ThS + NIR.

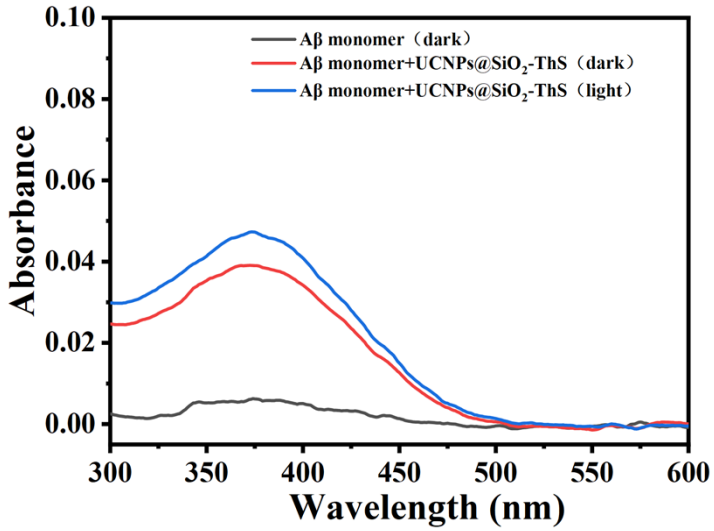

Figure S10 DNPH analysis of Aβ monomers under dark condition (black line), Aβ monomers incubated with UCNPs@SiO_2-ThS under dark condition (red line) and under the irradiation of NIR light (blue line).

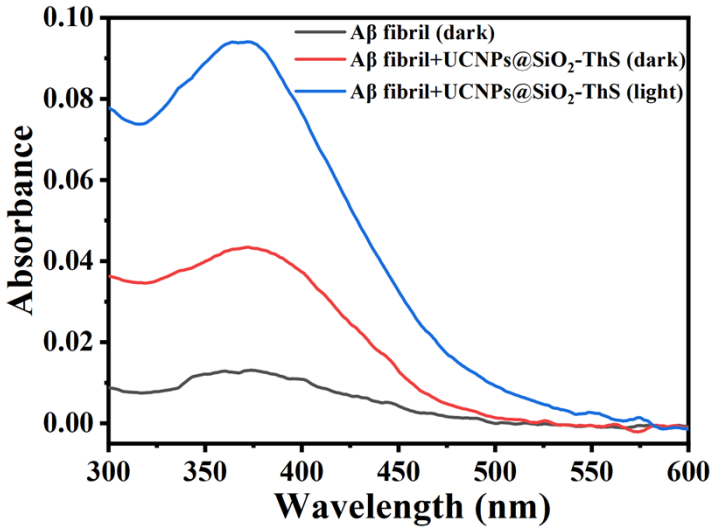

Figure S11 DNPH analysis of Aβ fibrils under dark condition (black line), Aβ fibrils incubated with UCNPs@SiO_2-ThS under dark condition (red line) and under the irradiation of NIR light (blue line).

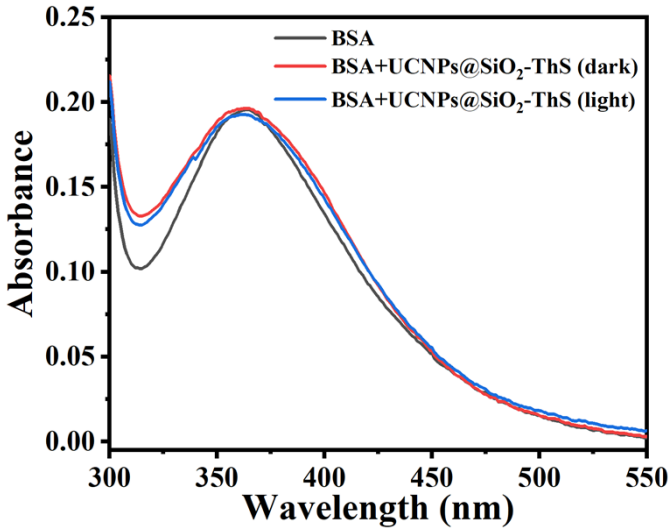

Figure S12 DNPH analysis of BSA under dark condition (black line), BSA incubated with UCNPs@SiO_2-ThS under dark condition (red line) and under the irradiation of NIR light (blue line).

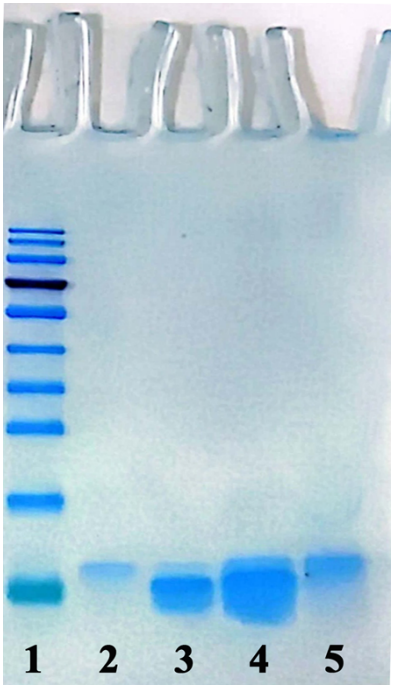

Figure S13 PAGE analysis of the protein absorbed by UCNPs@SiO_2-ThS/pep from the mixture of $A\beta_{42}$ oligomers and insulin. (1) marker; (2) $A\beta_{42}$ oligomers, (3) insulin, (4) the mixture of $A\beta_{42}$ oligomers and insulin, (5) the protein absorbed by UCNPs@SiO_2-ThS/pep from the mixture of $A\beta_{42}$ oligomers and insulin.

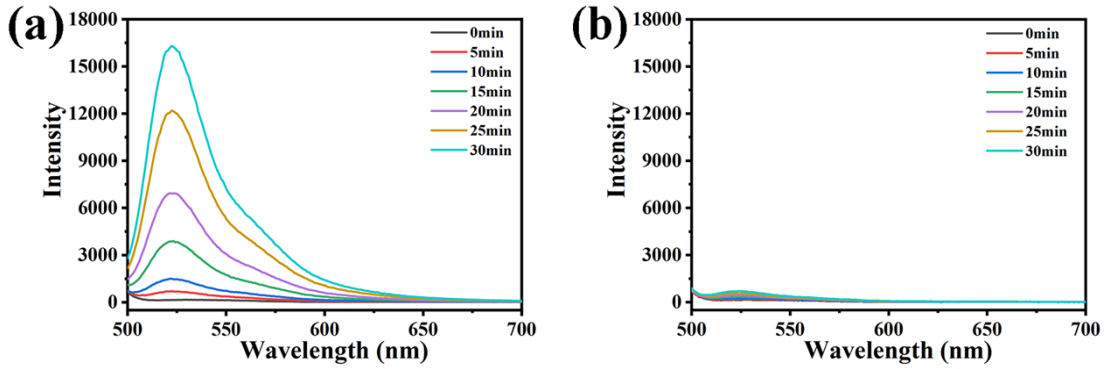

Figure S14 DCFH-DA assay for testing the generation of ROS by the incubation of UCNPs@SiO_2-ThS (a) with NIR irradiation or (b) without NIR irradiation.

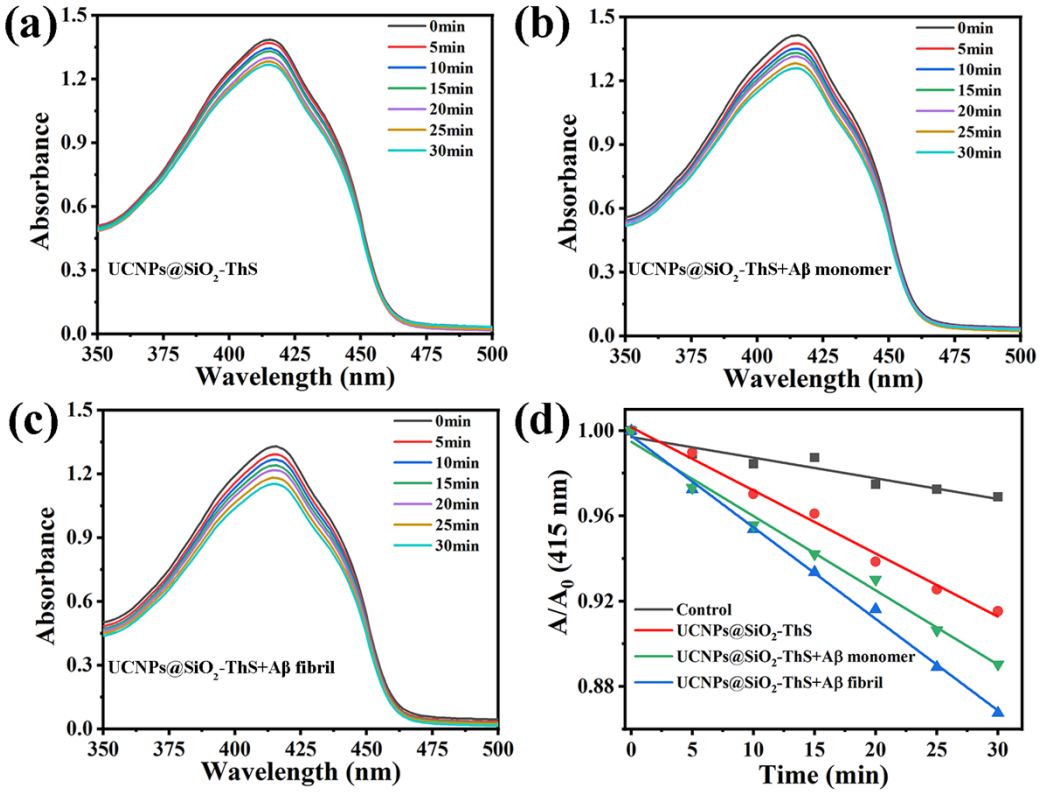

Figure S15 DPBF assay for testing the generation of $^1O_2$ by the irradiation of NIR light and incubation of (a) UCNPs@SiO_2-ThS, (b) UCNPs@SiO_2-ThS + Aβ monomers, (c) UCNPs@SiO_2-ThS + Aβ fibrils. (d) The generation of $^1O_2$ as a function of time by UCNPs@SiO_2-ThS with or without the incubation of Aβ42 monomers or fibrils.

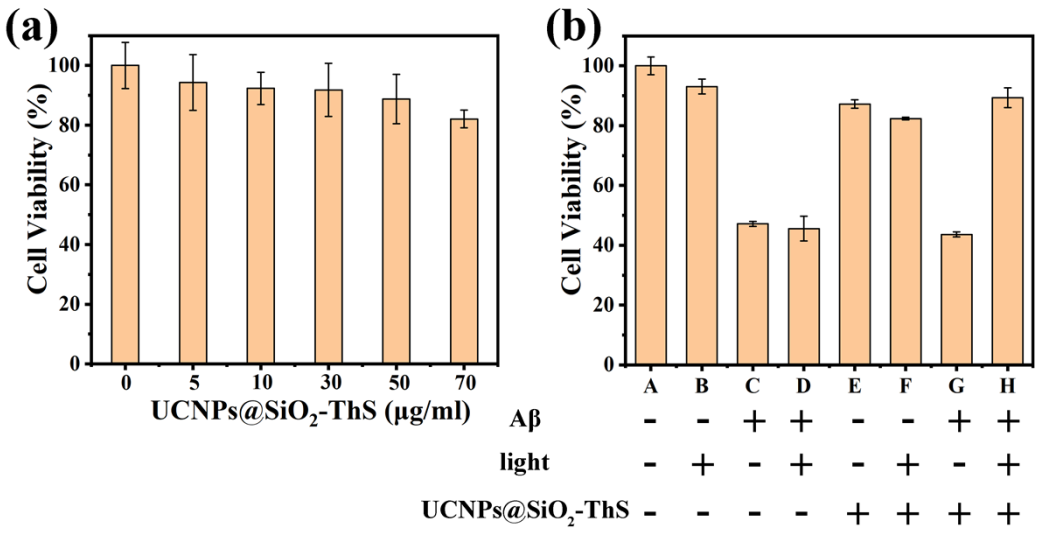

Figure S16 (a) Biocompatibility of UCNPs@SiO_2-ThS detected by MTT assay. (b) Aβ fibril induced PC12 cell viability in the presence or absence of UCNPs@SiO_2-ThS.