Electronic Supplementary Material (ESI) for Nanoscale.

Supplementary information

Real-time monitoring of Trojan horse effect of silver nanoparticles by a genetically encoded fluorescent cell sensor

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Additional experimental data related to UV-vis and DLS data of AgNPs in fresh DMEM medium (Figure S1), SDS-PAGE of the purified MT2a-FRET protein (Figure S2), the complete DNA and protein sequences of MT2a-FRET (Figure S3), confocal images of the MT2a-FRET cell line (Figure S4), changes of intracellular Ag concentrations in MT2a-FRET cells (Figure S5), and AgNPs dissolution in DMEM media with cell culture (Figure S6) are included in supplementary information.

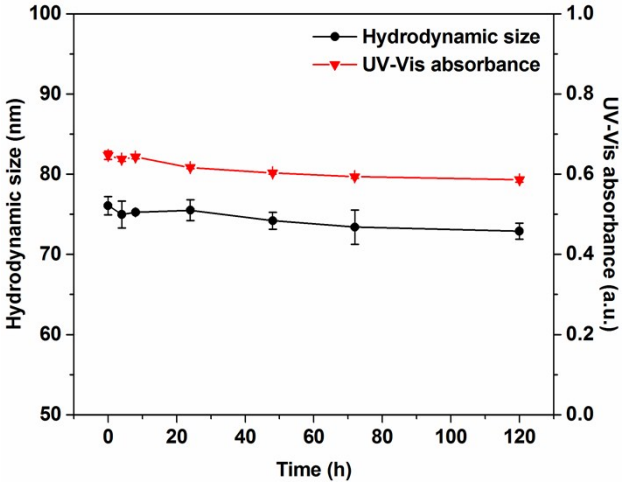

Figure S1. Stabilities of AgNPs in DMEM culture medium. UV-vis absorbance and hydrodynamic size of AgNPs in fresh DMEM medium with 10% FBS were monitored for 120h. Data are shown as mean ± SD (n=3).

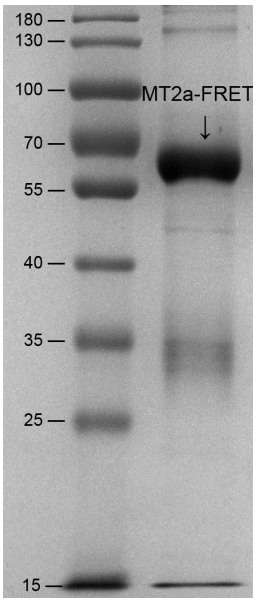

Figure S2. SDS-PAGE of the purified MT2a-FRET protein. Left lane: GeneRular as the protein marker, molecular weight of each band was labelled at left. Right lane: purified MT2a-FRET protein. The purity of the MT2a-FRET protein is > 90 %.

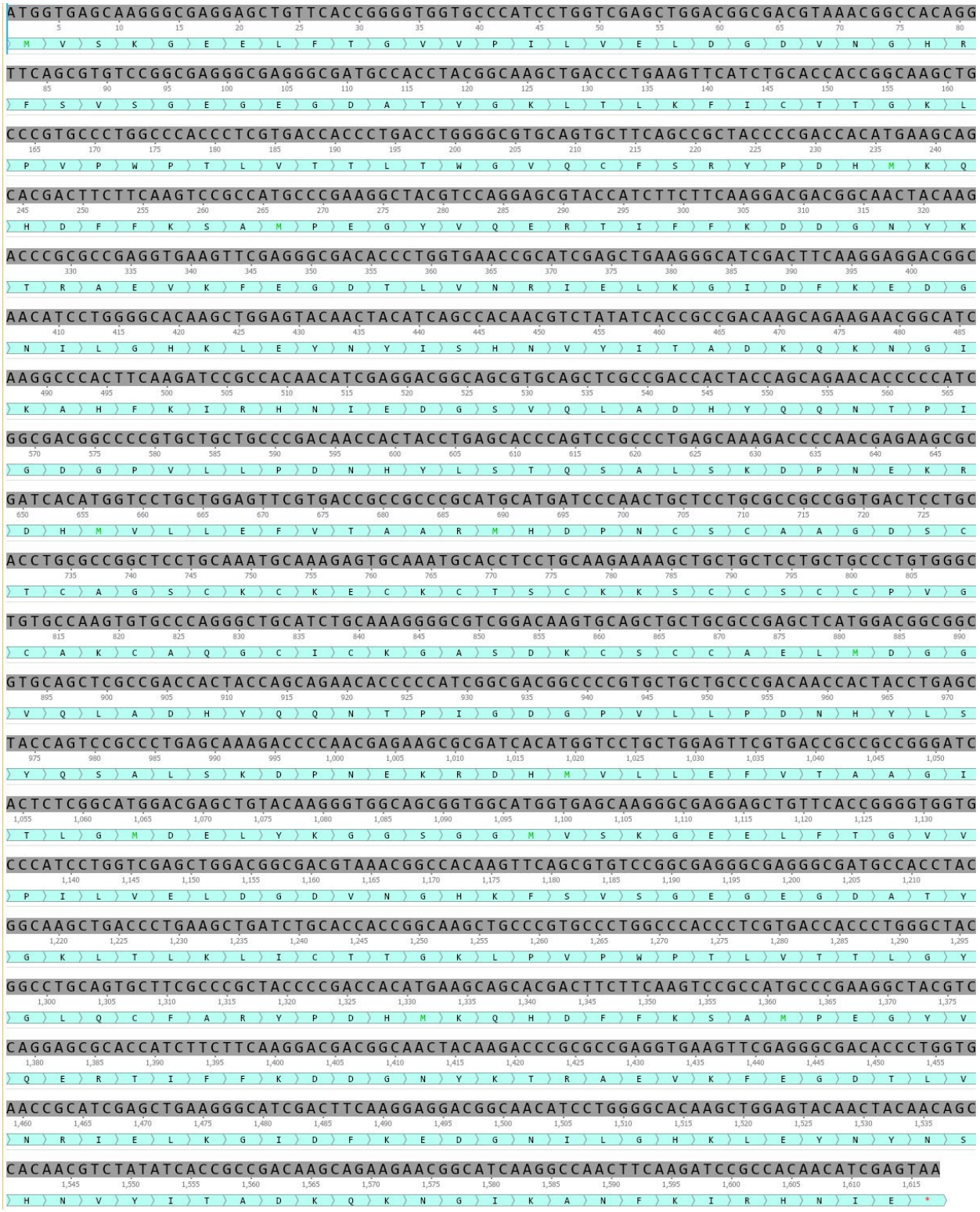

Figure S3. The complete DNA coding sequence and protein sequence of MT2a-FRET.

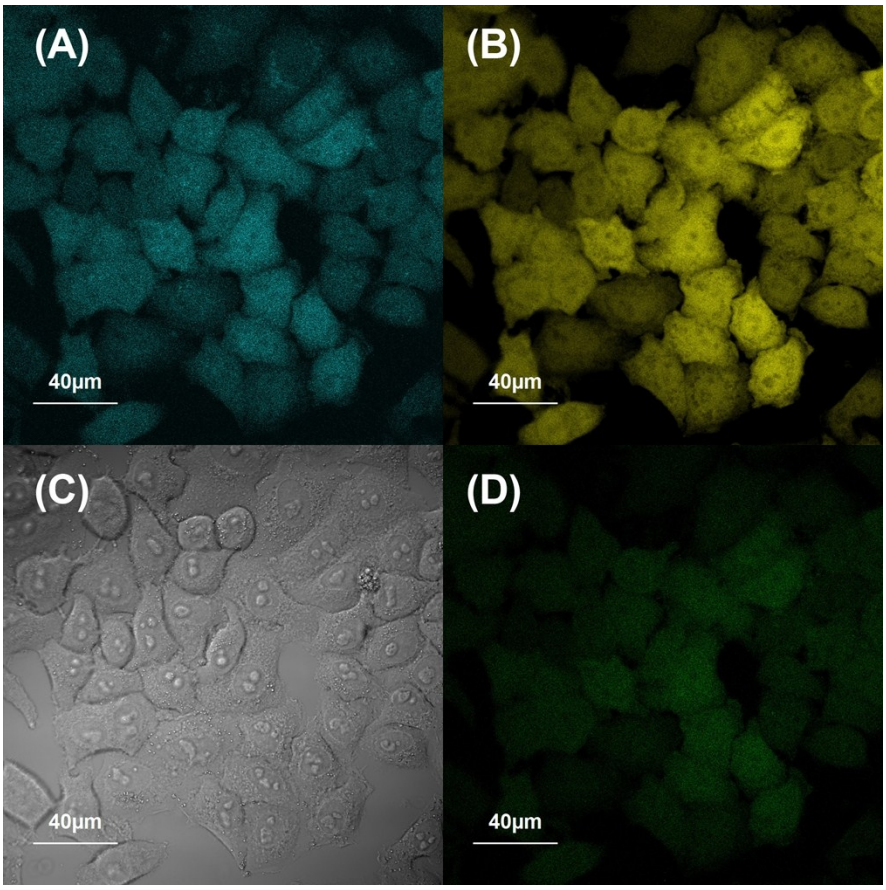

Figure S4. Images of the live MT2a-FRET cells under confocal microscope (Olympus FV1000 system). Images were taken with 60 × objective lens. (A) ECFP channel (Ex 405nm / Em 461 nm), (B) cpVenus channel (Ex 473nm / Em 527 nm), (C) Bright field channel and (D) FRET channel (Ex 405nm / Em 527 nm). Scale bar represents 40 μm.

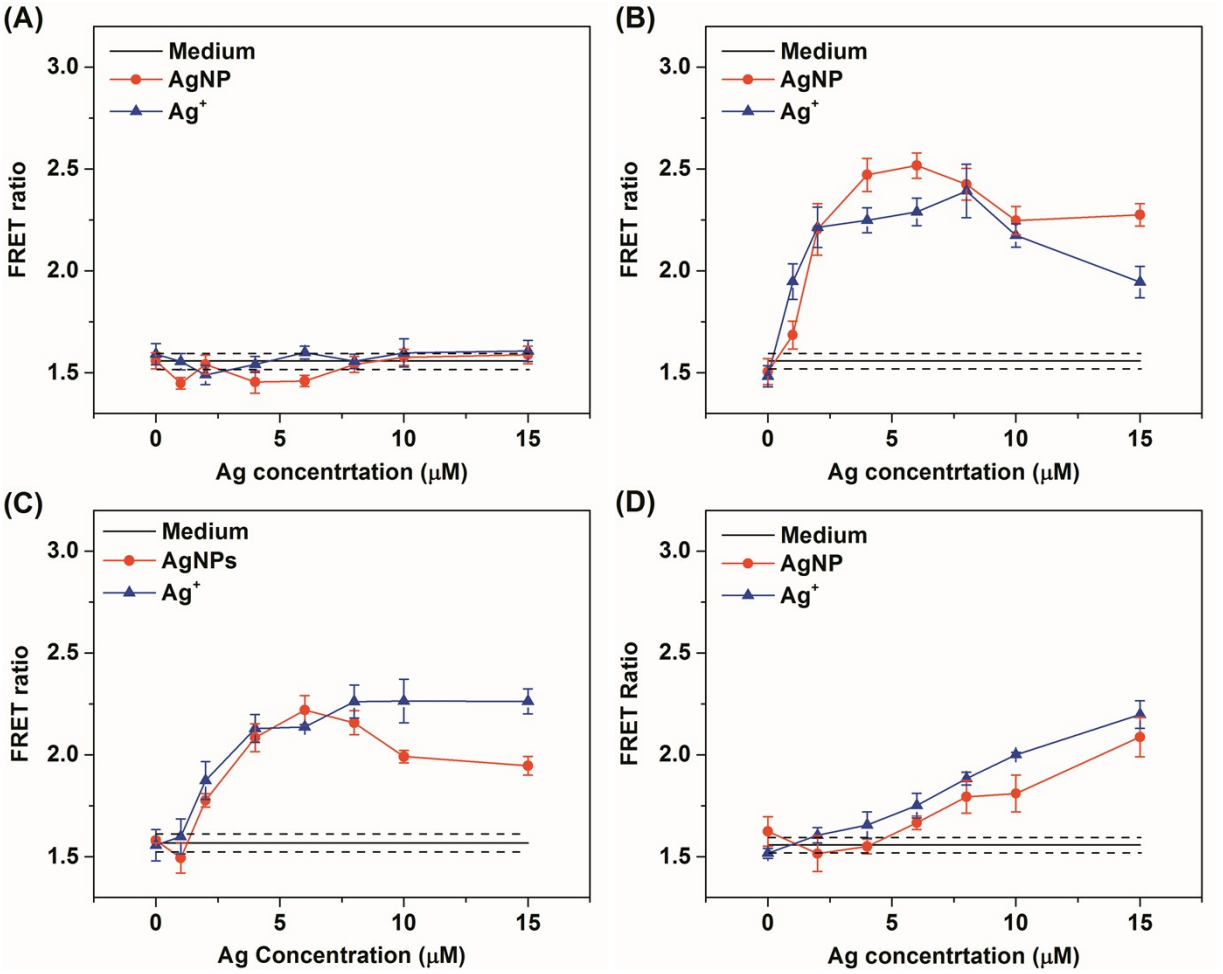

Figure S5. Comparisons of the FRET ratio in MT2a-FRET cells incubated with different atomic concentrations of AgNPs or $AgNO_3$ after (A) 0 h, (B) 6 h, (C) 24 h, and (D) 48 h treatment. The dashed lines represent the standard deviation of the medium group. The intracellular Ag^+ gradually decreased to the same level for both AgNPs and $AgNO_3$ treatment, and the intracellular Ag^+ were gradually diminished after 48 h treatment. Data are shown as mean ± SD (n=4).

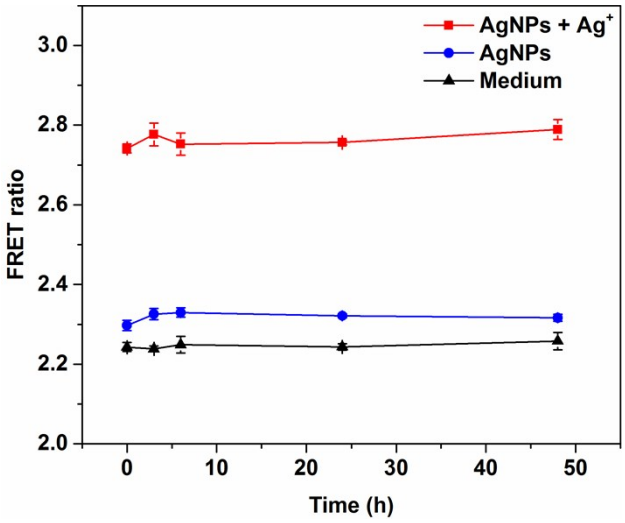

Figure S6. AgNP dissolution in cell culture medium. The cultured medium with 10 μM AgNPs from the cell FRET experiment was separated from the cells at different time point. Then 1 μM MT2a-FRET protein sensor was added to the cultured medium, and the FRET ratios were measured. After the measurement, additional 10 μM $AgNO_3$ was introduced to each well and the FRET ratios were measured again. The increase of the FRET ratios after $AgNO_3$ addition indicated that AgNPs in the cultured medium did not fully dissolved to Ag^+. Data are shown as mean ± SD (n=4).