Supporting Information

Defective Ag-In-S/ZnS Quantum Dots: An Oxygen-derived Free Radicals Scavenger for Mitigating the Macrophage Inflammation

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Materials

Indium chloride ($InCl_3$, Alfa Aesar, 99.9%), silver nitrate ($AgNO_3$, Alfa Aesar, 99.9%), sodium sulfide (Na_2S, Macklin, 90%), ammonium hydroxide (NH_4OH), mercaptoacetic acid (MAA, Aladdin, 98%), zinc acetate ($Zn(OAc)_2$, Alfa Aesar, ≥97%), isopropanol (Aladdin, 99.5%), 2,2-Diphenyl-1-picrylhydrazyl (DPPH·, Maklin, ≥96%), 2,2'-azino-bis (3-ethylbenzthiazoline-6-sulfonic acid) (ABTS, bidepharm, 95%), potassium persulfate ($K_2S_2O_8$, 3A, 99%), ferrous sulfate heptahydrate ($FeSO_4·7H_2O$, Alfa Aesar, 98%), salicylic acid (SA, bidepharm, 98%), hydrogen peroxide (H_2O_2, Sinopharm, 30%), lipopolysaccharide (LPS, Solarbio, 99%) were used as bought from manufacturers and used without additional purification. Superoxide anion assay kit was obtained from Nanjing Jiancheng Bioengineering Institute. ROS Brite 670 probe was ordered from Beijing Ouhe Technology Co., Ltd. Mouse TNF-α and IL-6 ELISA kits were purchased from Beijing Solarbio Science &

Technology Co., Ltd. Deionized water was used during the course of experiment.

Characterization

Transmission electron microscopy (TEM, JEM-2100, JEOL) were employed to observe the surface morphology of AIS/ZnS QDs. Hydrodynamic sizes and ζ-potential measurements were obtained on a Zetasizer (Nano-ZS 90, Malvern). Powder X-ray diffraction (XRD, Bruker D8 Advance, Bruker) measurements were used to study the crystal structure of AIS/ZnS QDs. The UV-Vis spectrum was carried out on UV-Vis double-beam spectrophotometer (TU-1901, Persee). The fluorescence spectrum was acquired with fluorescence spectrometer (F-7000, Hitachi). The absolute PL quantum yields (QYs) of AIS/ZnS QDs were analyzed using integrated sphere (C9920-02G, Hamamatsu Photonics). X-ray photoelectron spectroscopy (XPS, ESCALAB 250Xi, ThermoFisher) was adopted to study the chemical compositions of AIS/ZnS QDs. A confocal laser scanning microscopy (CLSM, FV1000, Olympus) was used to obtain the confocal fluorescence images. The cytotoxicity assay of AIS/ZnS QDs was performed on the microplate reader (Multiskan FC, Thermo Fisher).

Cytotoxicity Measurements of AIS/ZnS QDs

For the cytotoxicity studies of AIS/ZnS QDs, Raw 264.7 cells were firstly cultured in 96-well plates for 24 h. After removal of the medium, the as-prepared samples containing various concentrations of AIS/ZnS QDs (0-120 μg/mL) were added to the cells for 12 h. The cells were then washed by PBS (0.01 M, pH=7.4) for twice. Subsequently, 100 μL MTT solution was added to each well of 96-well plates and the

cells was incubated for additional 4 h. When the medium of each well was replaced by 100 μL DMSO, the absorbance was measured with microplate reader at 570 nm.

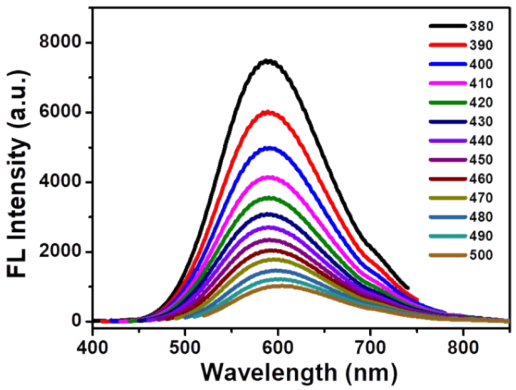

Figure S1 The fluorescence emission spectra of AIS/ZnS QDs under different wavelength excitation from 380 nm to 500 nm.

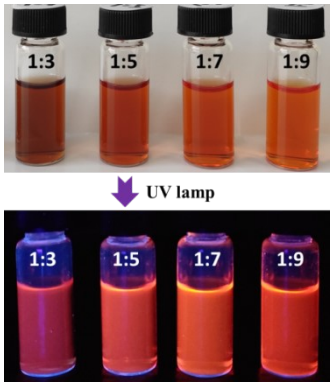

Figure S2 Photographs of Ag-In-S QDs solutions with different [Ag]/[In] feed molar ratio taken under daylight and under UV-365 nm lamp.

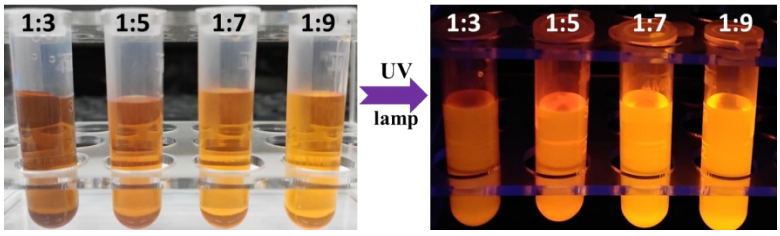

Figure S3 Photographs of AIS/ZnS QDs solutions with different [Ag]/[In] feed molar ratio taken under daylight and under UV-365 nm lamp.

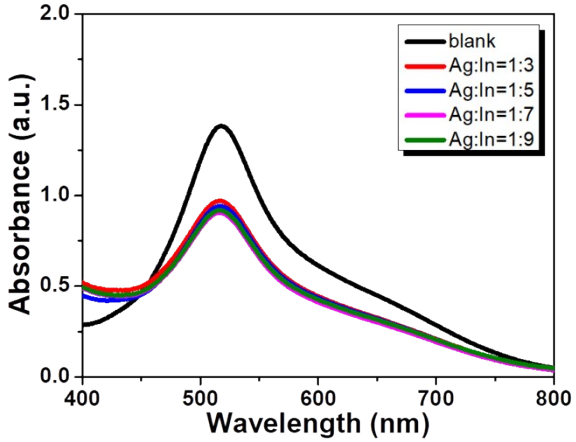

Figure S4 The elimination efficiency of AIS/ZnS QDs with different [Ag]/[In] feed molar ratio at the same concentration (33.3 μg/mL) toward DPPH· (100 μM).

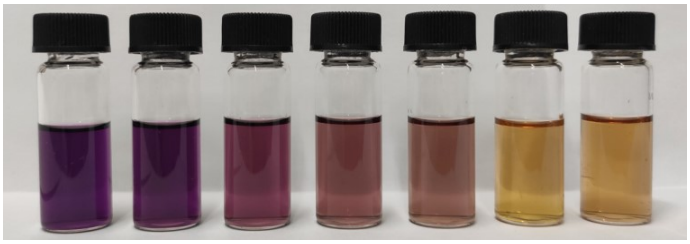

Figure S5 Photograph of DPPH· solutions exposed to different concentrations of AIS/ZnS QDs (from left to right: 0-233 μg/mL).

Figure S6 Photographs of ABTS· solutions exposed to different concentrations of AIS/ZnS QDs (from left to right: 0-6 μg/mL).

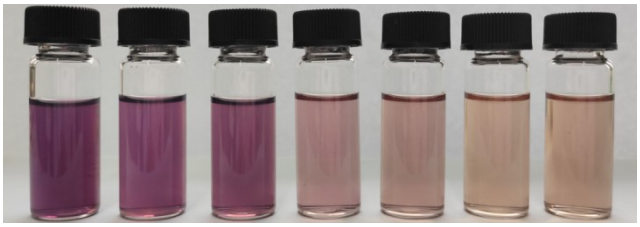

Figure S7 Photograph of ·OH solutions exposed to different concentrations of AIS/ZnS QDs (from left to right: 0-135 μg/mL).

Figure S8 Photograph of $\cdot O_2^-$ solutions exposed to different concentrations of AIS/ZnS QDs (from left to right: 0-176 μg/mL).

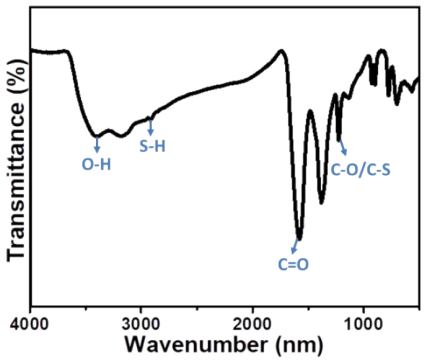

Figure S9 FT-IR spectrum of AIS/ZnS QDs.

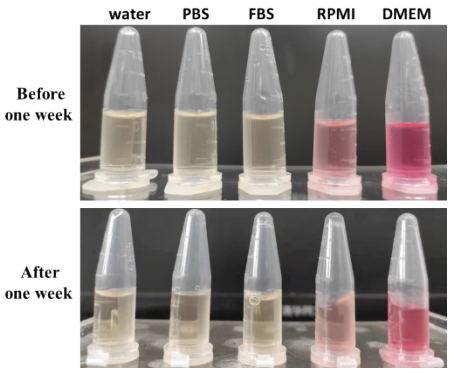

Figure S10 Optical images of AIS/ZnS QDs in water, PBS, 10% FBS, RPMI-1640, and DMEM, before and after storage for one week.

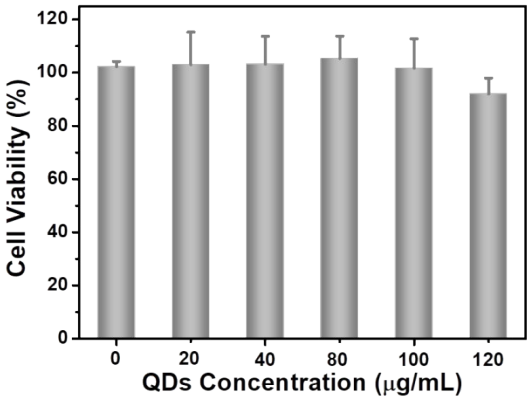

Figure S11 Cell viability of Raw 264.7 cells after incubated with various concentrations of AIS/ZnS QDs.

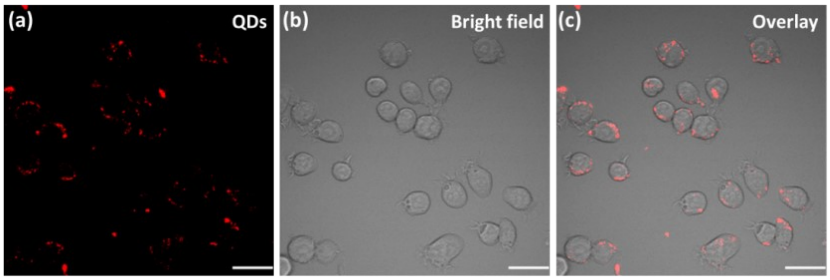

Figure S12 Confocal microscopy images of Raw 264.7 cells incubated with AIS/ZnS QDs (50 μg/mL) for 6 h in (a) QDs, (b) bright field, and (c) overlay channels, respectively. (scale bars: 20 μm).