Electronic Supplementary Information

Boronate Carbon Nanoparticles Featuring Efficient FRET for Activatable Two-Photon Fluorescence Imaging of Sialic Acid Surface-Abundant Tumor Cells

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Additional Experimental Details

Apparatus and Characterization. Transmission electron microscope (TEM) images were acquired on field-emission 2100F TEM (JEOL, Japan) with the 200 kV acceleration voltage. Malvern Zetasizer 3000 HS particle size analyzer (Malvern, UK) was used to perform zeta potential and dynamic light scattering (DLS) measurements. X-ray photoelectron spectroscope (Thermo Fisher, USA) was applied to measure the X-ray photoelectron spectroscopy (XPS). Raman spectra were recorded utilizing Renishaw InVia Raman inverted microscope (Renishaw, UK) at a laser wavelength of 785 nm. UV-vis absorption spectra were collected on UV-2450 spectrometer (Shimadzu, Japan). One-photon fluorescence emission spectra were measured through a Hitachi FL-7000 spectrometer (Hitachi, Japan). Two-photon fluorescence spectra were excited by mode-locked Ti: Sapphire femtosecond pulsed laser (Chameleon Ultra I, Coherent, USA) and recorded with DCS200PC photon counting with Omno-λ 5008 monochromator (Zolix, China). Thermo Scientific Multiskan Microplate Reader (Thermo Fisher, USA) was applied to measure the absorbance. Two-photon fluorescence images of cells and tissues were captured on an Olympus FV1000 multi-photon laser scanning confocal microscope (Olympus, Japan) with a Maitai DeepSee femtosecond laser.

Cell culture. MCF-7, HeLa and Hacat cells were cultured in the Dulbecco's modified Eagle's medium (DMEM) supplemented with 10% (v/v) fetal bovine serum, penicillin (100 U/mL) and streptomycin (100 U/mL) in a humidified atmosphere at 37 °C containing 5% CO_2.

Fig. S1 Photograph of (A) APBA and (B) BCNPs aqueous solution.

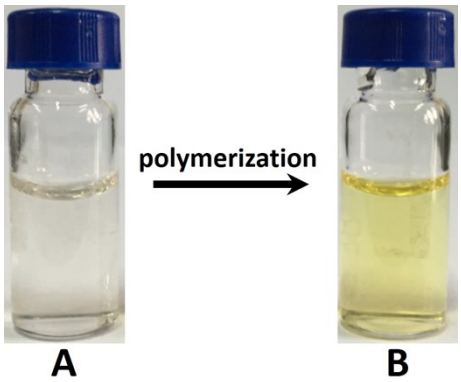

Fig. S2 Dynamic light scattering (DLS) of the BCNPs.

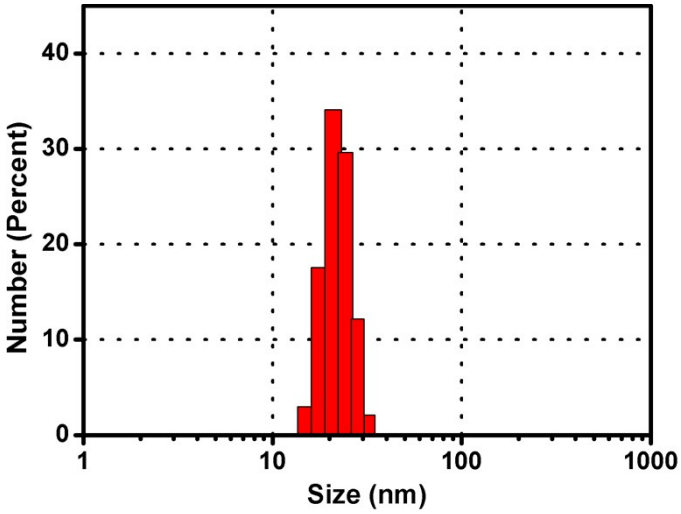

Fig. S3 UV-vis absorption (red) and one-photon fluorescence emission spectrum (blue) of the BCNPs (λ_{ex} = 350 nm).

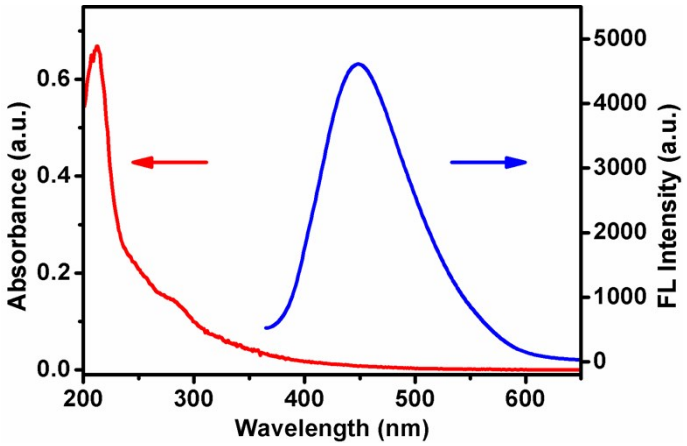

Fig. S4 Determination the quantum yield (QY) of BCNPs using plots of integrated fluorescence intensity versus peak absorbance. Quinine sulphate (QY = 55%) was used as standard (blue squares). The QY of the BCNPs (red dots) was calculated to be 4.3%.

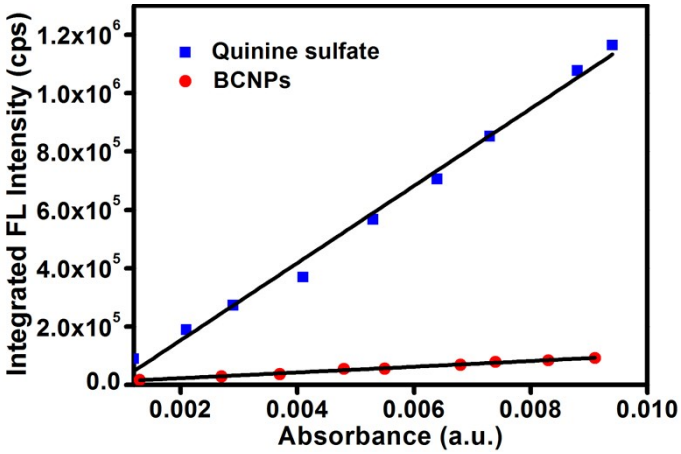

Fig. S5 X-ray photoelectron spectroscopy (XPS) analysis of Mn 2p for MnO_2 nanosheets in BCNPs@MnO_2 nanocomposites.

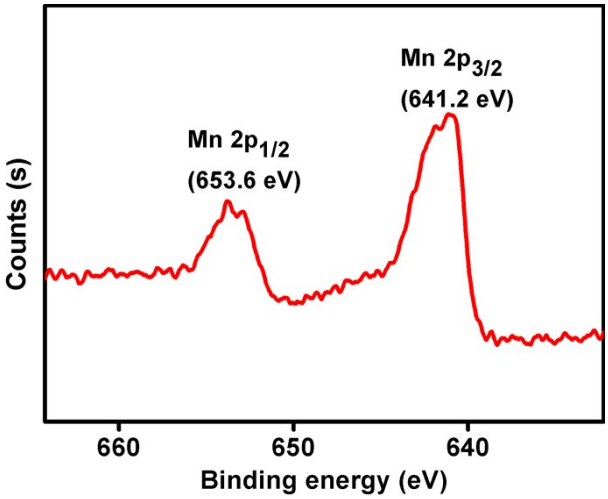

Fig. S6 Viability of MCF-7 cells after treatment with the BCNPs and BCNPs@MnO_2 nanocomposites at different concentrations for 12 h, respectively.

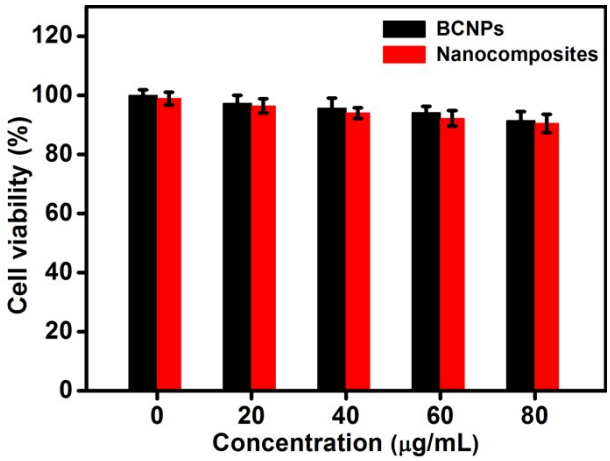

Fig. S7 (A) Fluorescence images of MCF-7 cells after incubation with 20 μg/mL BCNPs@MnO_2 nanocomposites for 2 h followed by staining with 100 nM Lyso-Tracker Red for 20 min. (B) Fluorescence profiles of BCNPs@MnO_2 nanocomposites (blue line) and Lyso-Tracker (red line) along the white line in corresponding merge image.

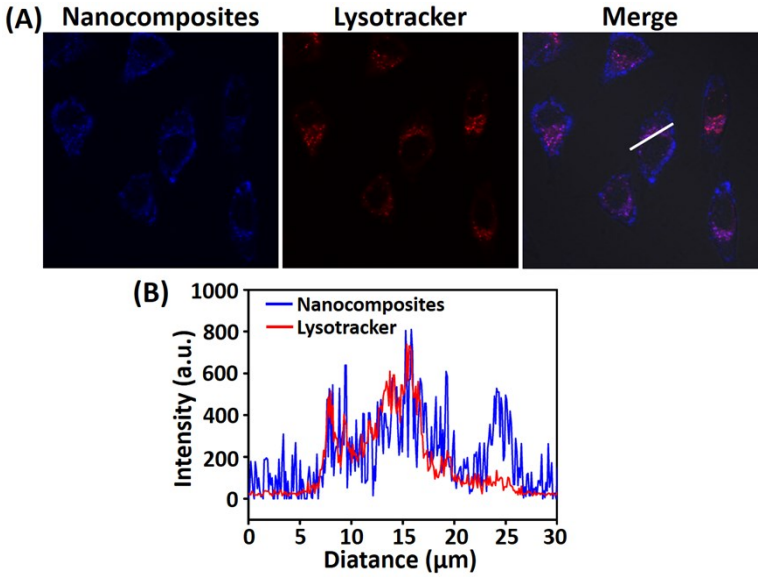

Fig. S8 Z-axis scanning images of MCF-7 cells incubated with 20 μg/mL BCNPs@MnO_2 nanocomposites at 37 °C for 2 h, the images were acquired with the step interval of 1.28 μm.

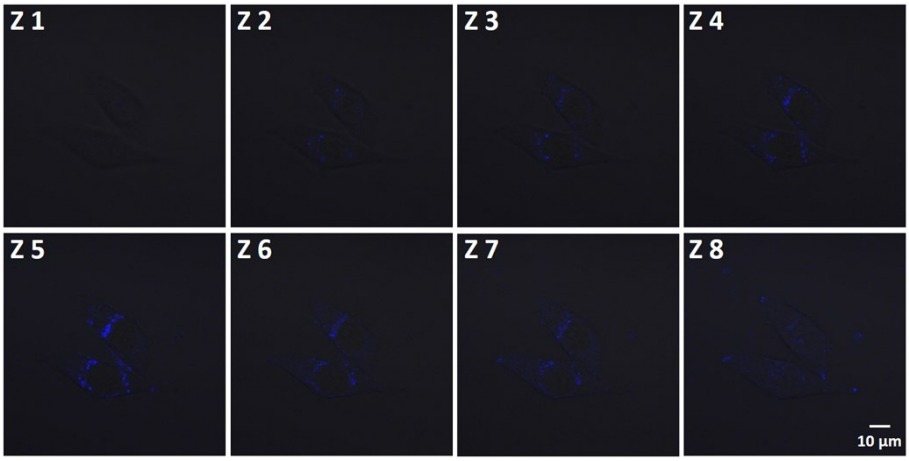

Fig. S9 (A) Real-time two-photon confocal fluorescence imaging of MCF-7 cells incubated with 20 μg/mL BCNPs@MnO_2 nanocomposites at 37 °C. (B) The mean fluorescence intensity in panel (A).