

Supporting Information

Theranostic nanocomposite from upconversion luminescent nanoparticles and black phosphorus nanosheets

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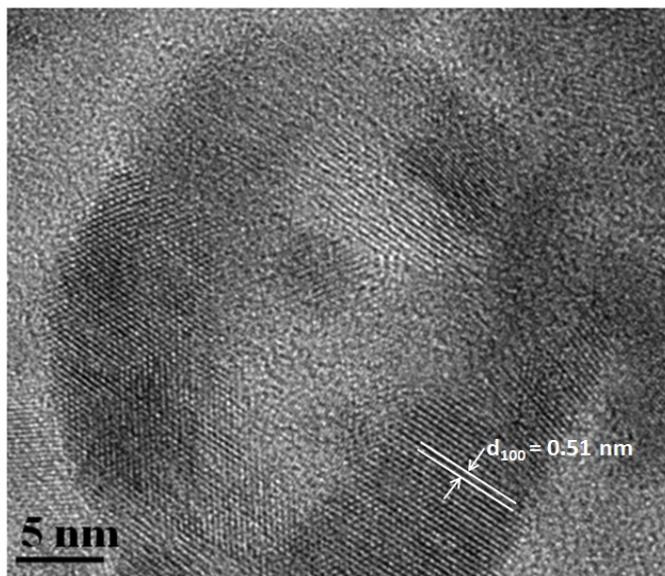


Fig. S1. High resolutions transmission electron microscopy (HRTEM) image of UCNP that show the lattice fringes.

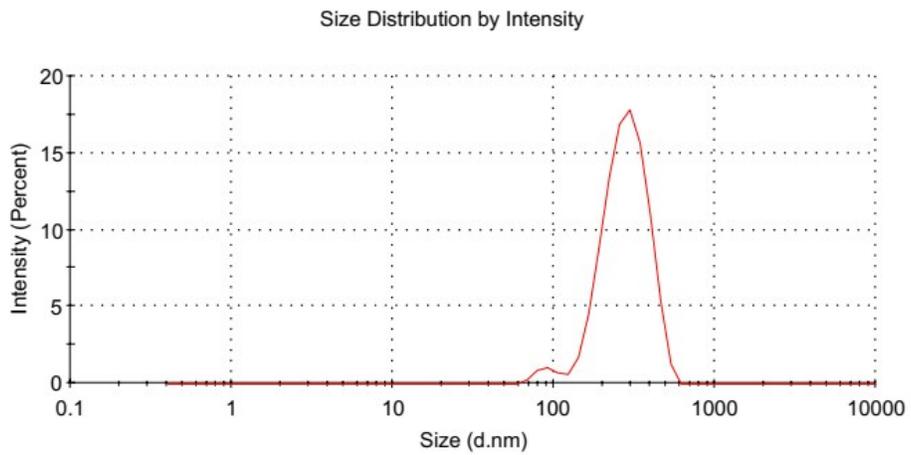


Fig. S2. The dynamic light scattering (DLS) size of UCNP-BPNS nanocomposite.

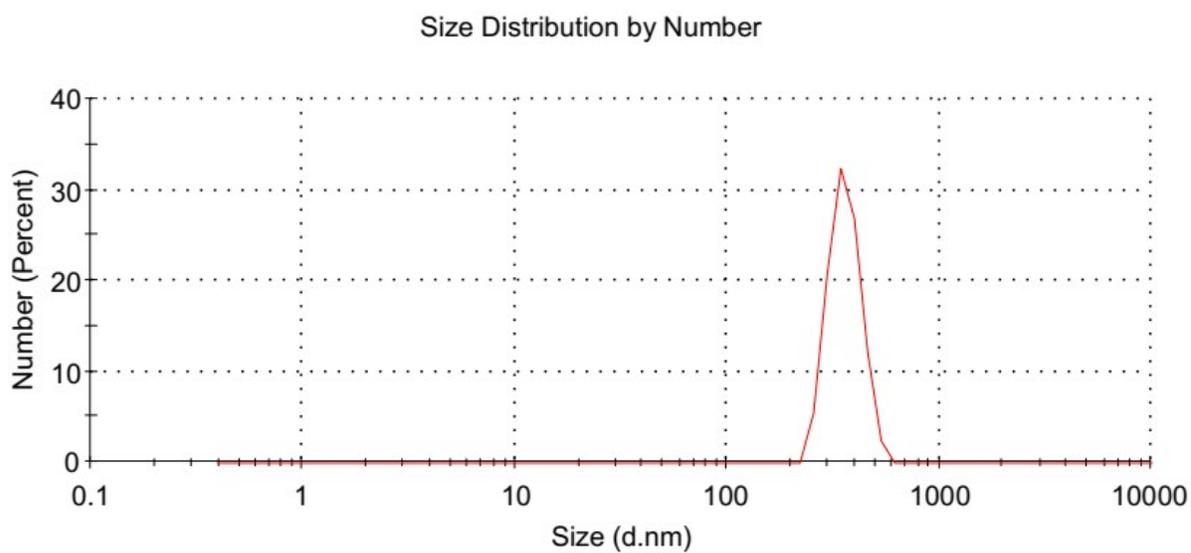


Fig. S3. The dynamic light scattering (DLS) size of UCNP-BPNS dispersed in phosphate buffer saline (PBS).

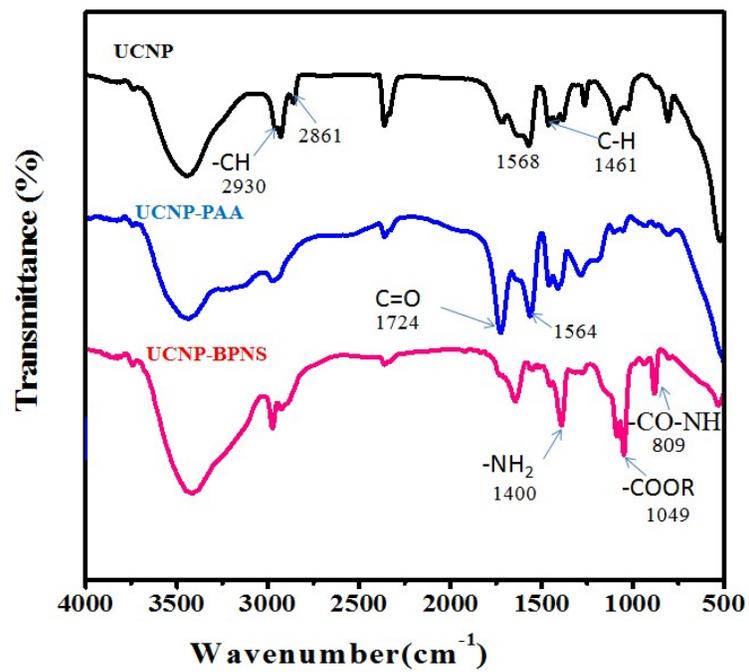


Fig. S4. FT-IR spectra of UCNP, UCNP-PAA, and UCNP-BPNS nanocomposite.

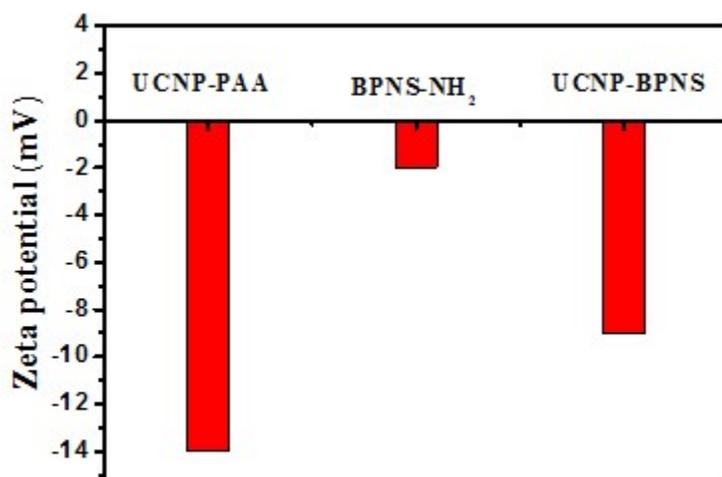


Fig. S5. Zeta potentials of upconversion nanoparticles modified with PAA (UCNP-PAA), BPNS modified with PEG-NH₂ (BPNS-NH₂), and UCNP-BPNS nanocomposite.

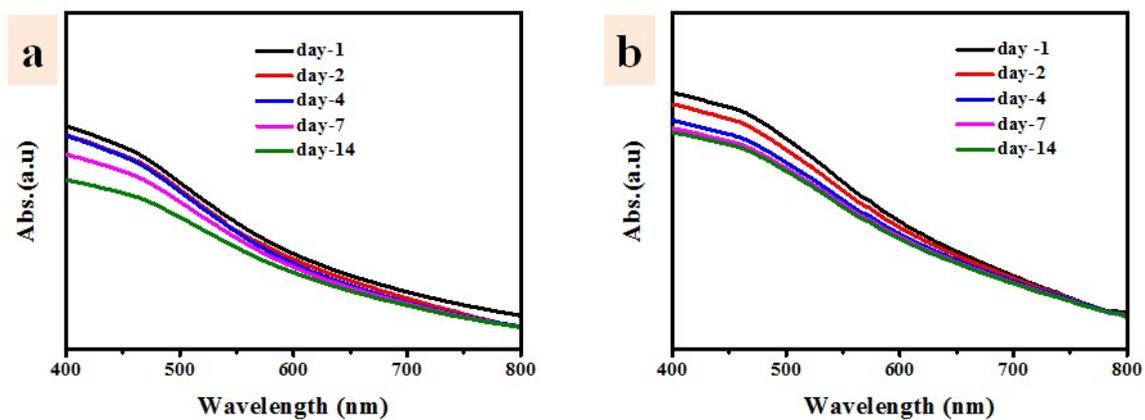


Fig. S6. Absorption spectra of (a) PEG-NH₂ modified BPNS (BPNS-NH₂) and (b) UCNP-BPNS nanocomposite dispersed in deionized water measured during two weeks.

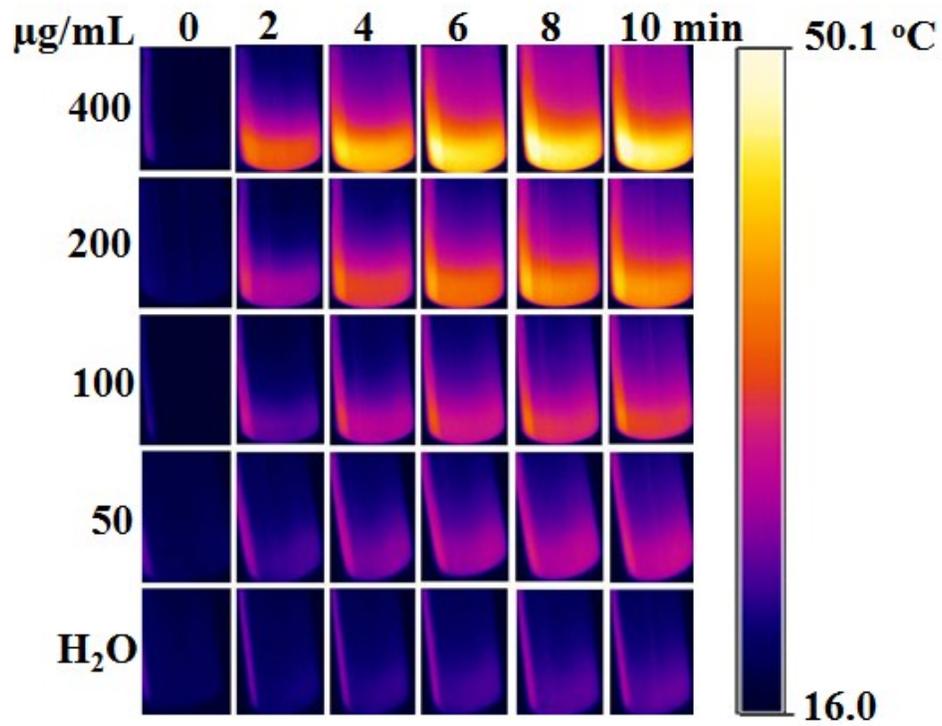


Fig. S7. Infrared thermal images of different concentrations (50-400 µg/mL) of UCNP-BPNS nanocomposite irradiated with 808 nm laser (1.5 W/cm²) at different time points (0-10 min). Water is used for comparison.

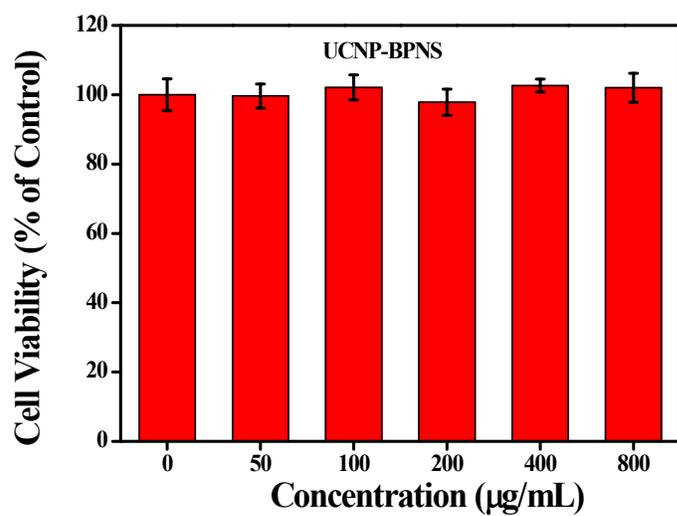


Fig. S8. Cytotoxicity assays of HeLa cells incubated with UCNP-BPNS nanocomposite with different concentrations for 24 h.

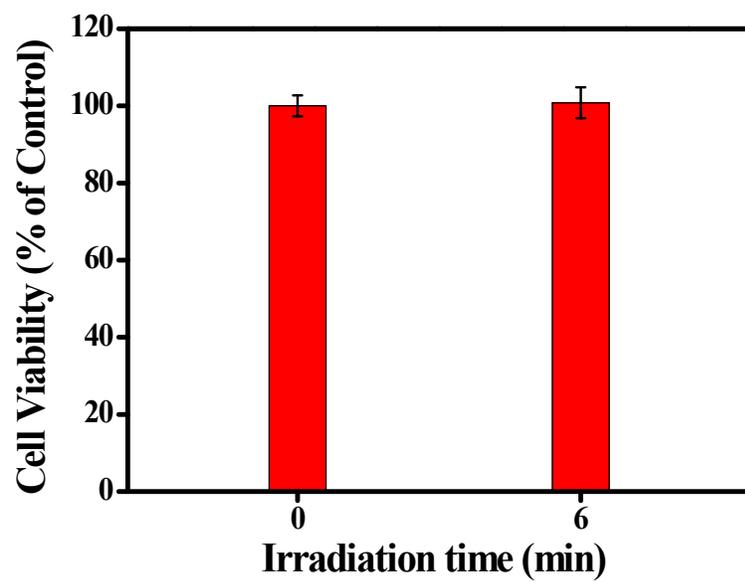


Fig. S9. Cytotoxicity assays of HeLa cells irradiated with 980 nm laser with power density of 0.5 W/cm² for 6 min (2 min breaks after every 2 min irradiation) as compared to the control (without laser irradiation, that is, the irradiation time is 0).

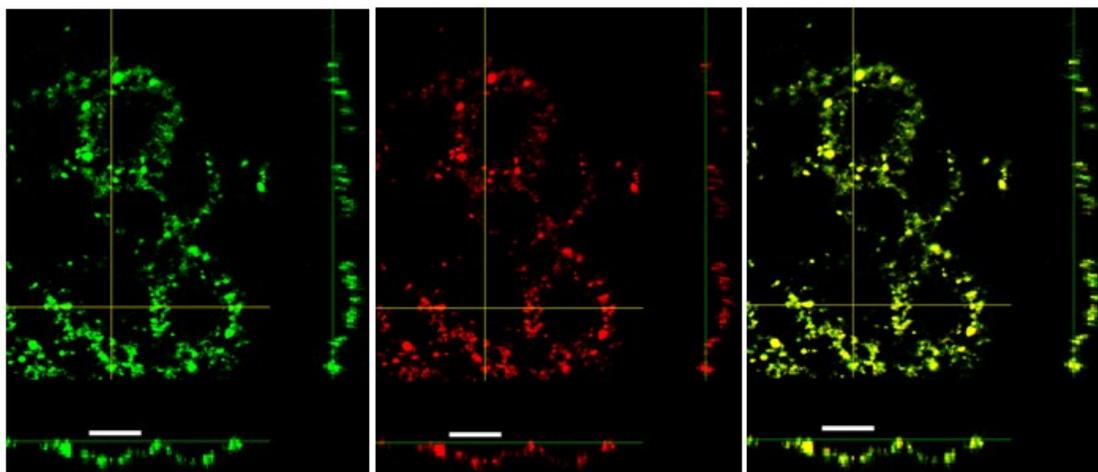


Fig. S10. The three-dimensional confocal laser scanning microscopy (CLSM) images of HeLa cells after incubation with 400 $\mu\text{g}/\text{mL}$ of UCNP-BPNS for 4 h collected as series along the Z optical axis, that shows upconversion luminescence images of green (500-600nm), red (600-700 nm), and overly of green and red channels, $\lambda_{\text{ex}}=980\text{ nm}$, 500 mW.