## **Supporting Information**

## Different-sized black phosphorus nanosheets with good

## cytocompatibility and high photothermal performance

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Figure S1. HRTEM image of BP nanosheets.



**Figure S2.** Photothermal heating curves of distilled water and the L-BP, M-BP, S-BP water suspension at different concentrations (12.5 and 50.0  $\mu$ g/mL) irradiated with an 808 nm laser (1.0 W/cm<sup>2</sup>). (a) 12.5  $\mu$ g/mL. (b) 50.0  $\mu$ g/mL.



**Figure S3.** Absorbance spectra of L-BP (a), M-BP (b), S-BP (c) stored in DMSO for up to 7 days. Insets: Absorption ratios ( $A/A_0$ ) at 808 nm.



**Figure S4.** CCK-8 assays of (a) Hela cells, and (b) MCF-7 cells before and after the incubation with the three BP nanosheets for 24 h at different concentrations (6.3, 12.5, 25.0 and 50.0  $\mu$ g/mL). The data are represented as means ± standard deviation. Almost no cytotoxicity can be observed for the two types of cells even at a high concentration of 50.0  $\mu$ g/mL.