

## Supporting Information

### Construction of A Triple-Stimuli-Responsive System Based on Cerium Oxide Coated

#### Mesoporous Silica Nanoparticles

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**Fig. S1**

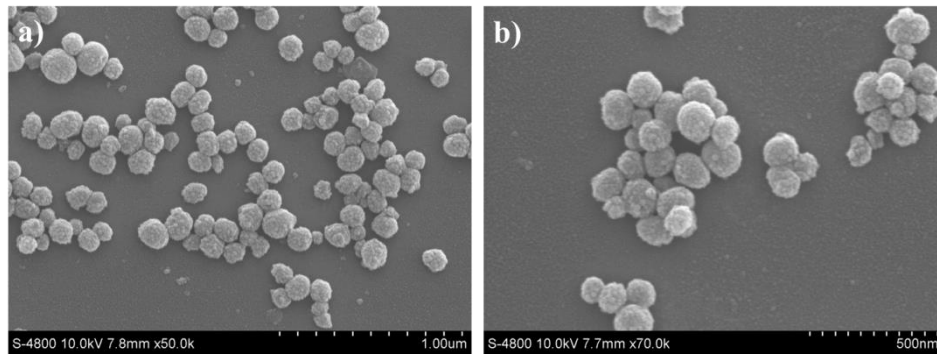


Fig. S1 SEM micrographs of (a) MSN-HP and (b) MSN-HP-DOX.

**Fig. S2**

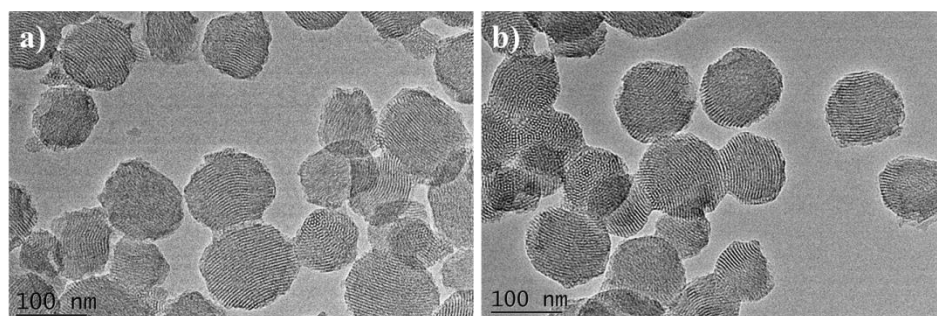


Fig. S2 HRTEM micrographs of (a) MSN-HP and (b) MSN-HP-DOX.

Fig. S3

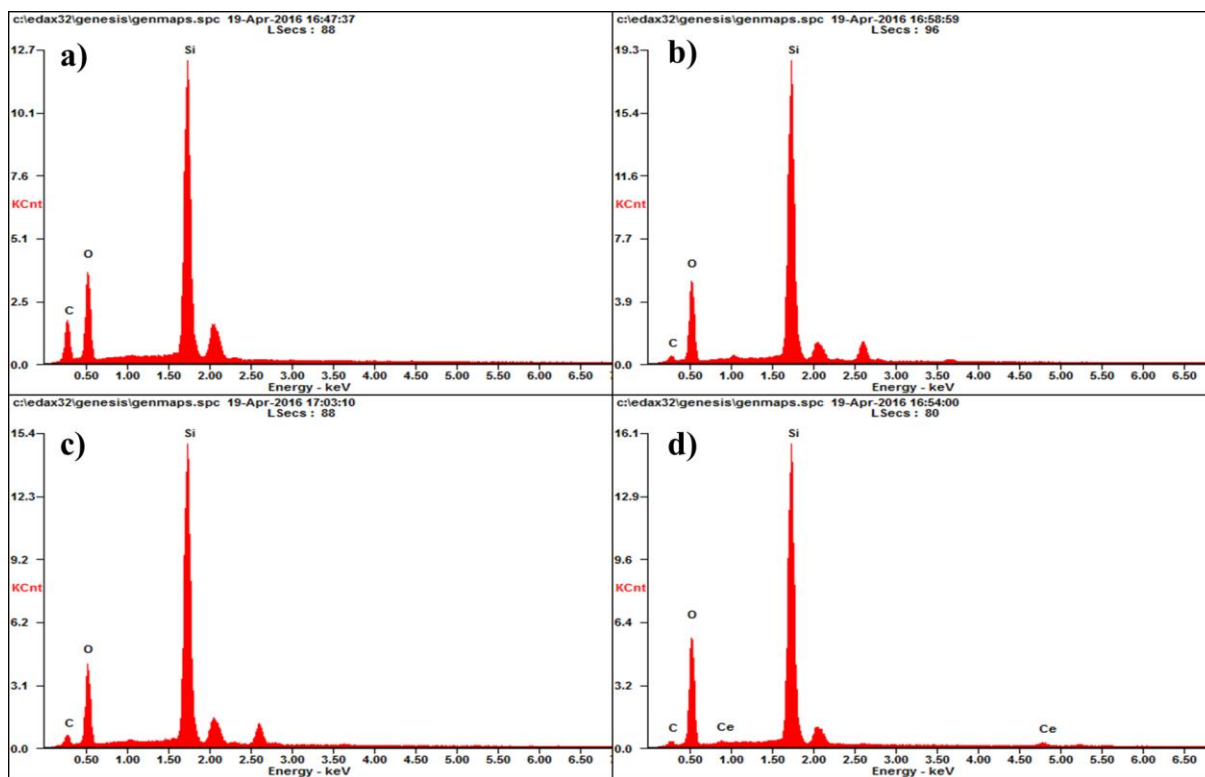


Fig. S3 EDX spectrum of (a) MSN; (b) MSN-HP; (c) MSN-HP-DOX; (d) MSN-HP-DOX@CeO<sub>2</sub>.

Fig. S4

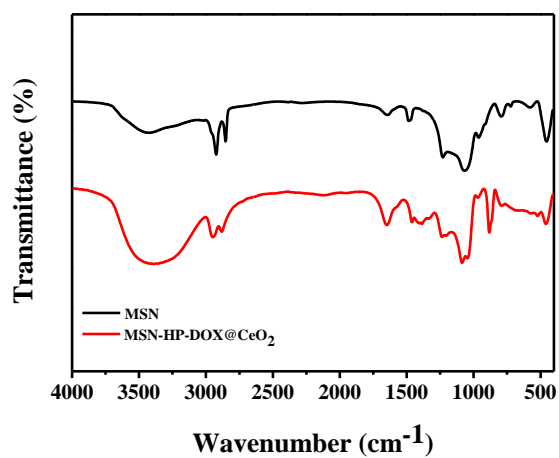


Fig. S4 FTIR spectra of MSN and MSN-HP-DOX@CeO<sub>2</sub>.

Fig. S5

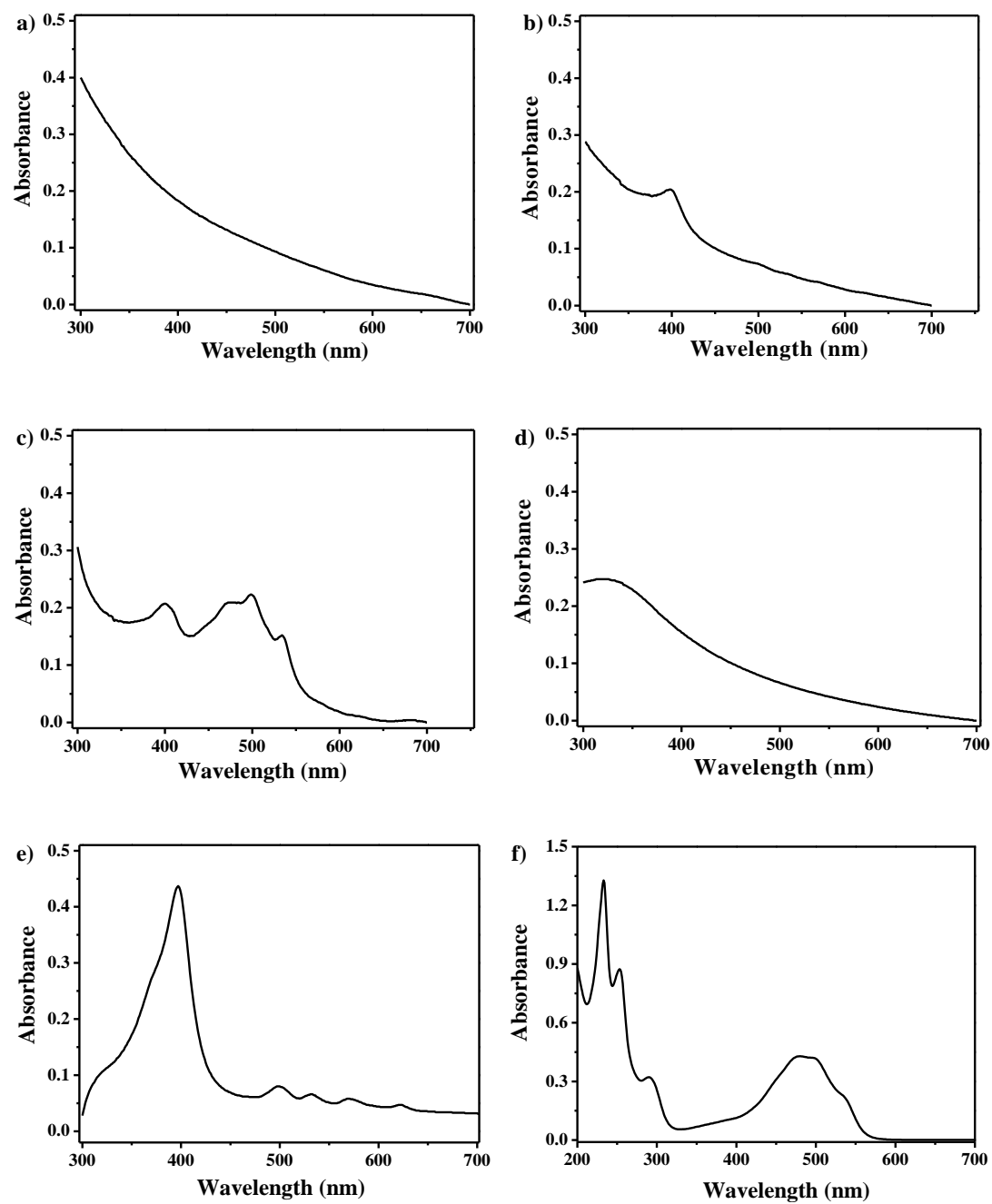


Fig. S5 Absorbance spectrum of MSN (a), MSN-HP (b), MSN-HP-DOX (c), MSN-HP-DOX@CeO<sub>2</sub> (d), HP (e) and DOX (f).

**Fig. S6**

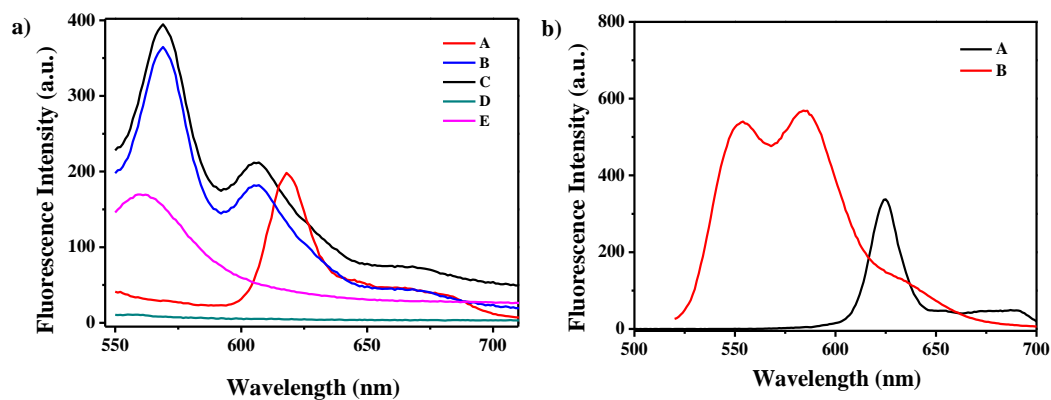


Fig. S6 (a) Emission spectra of MSN-HP (A), MSN-HP-DOX (B), MSN-HP-DOX with the addition of GSH (C), MSN-HP-DOX@CeO<sub>2</sub> without the addition of GSH and irradiation (D), MSN-HP-DOX@CeO<sub>2</sub> with the addition of GSH and irradiation (E)  $\lambda_{\text{ex}} = 480$  nm. (b) Emission spectra of HP (A) and DOX (B)  $\lambda_{\text{ex}} = 480$  nm.

**Fig. S7**

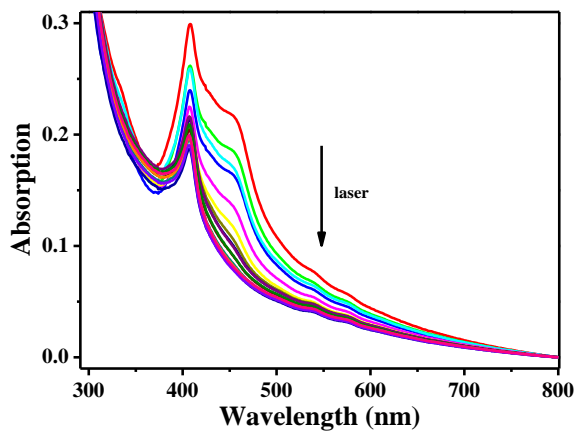


Fig. S7 Determination of the generation of singlet oxygen of MSN-HP-DOX@CeO<sub>2</sub> through the absorption of DPBF upon irradiation by laser at 633 nm for 0 min, 5 min, 10 min, 15 min, 20 min, 25 min, 30 min, 35 min, 40 min, 45 min, 50 min, 55 min, 60 min, 70 min, 80 min, 90 min and 120 min).