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Supporting Information

CORMs loaded nanoplatform for the single NIR light-activated bioimaging, gas therapy, and photothermal therapy *in vitro*

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Figure S1. Digital photo of UmPF (800 μg/mL) water dispersion

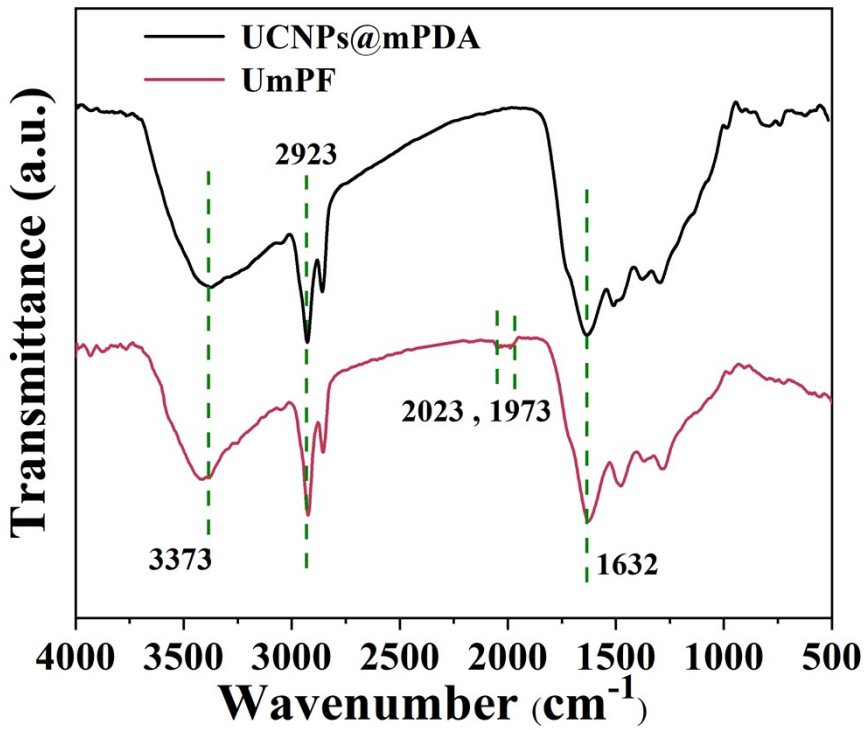

Figure S2. FT-IR spectra of UCNPs@mPDA (black line) and UmPF nanoplatform (red line)

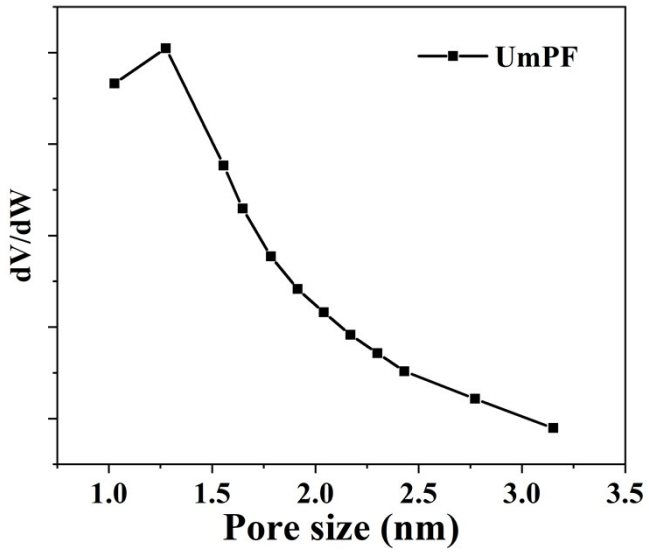

Figure S3. Pore size distribution of UmPF nanoplatform.

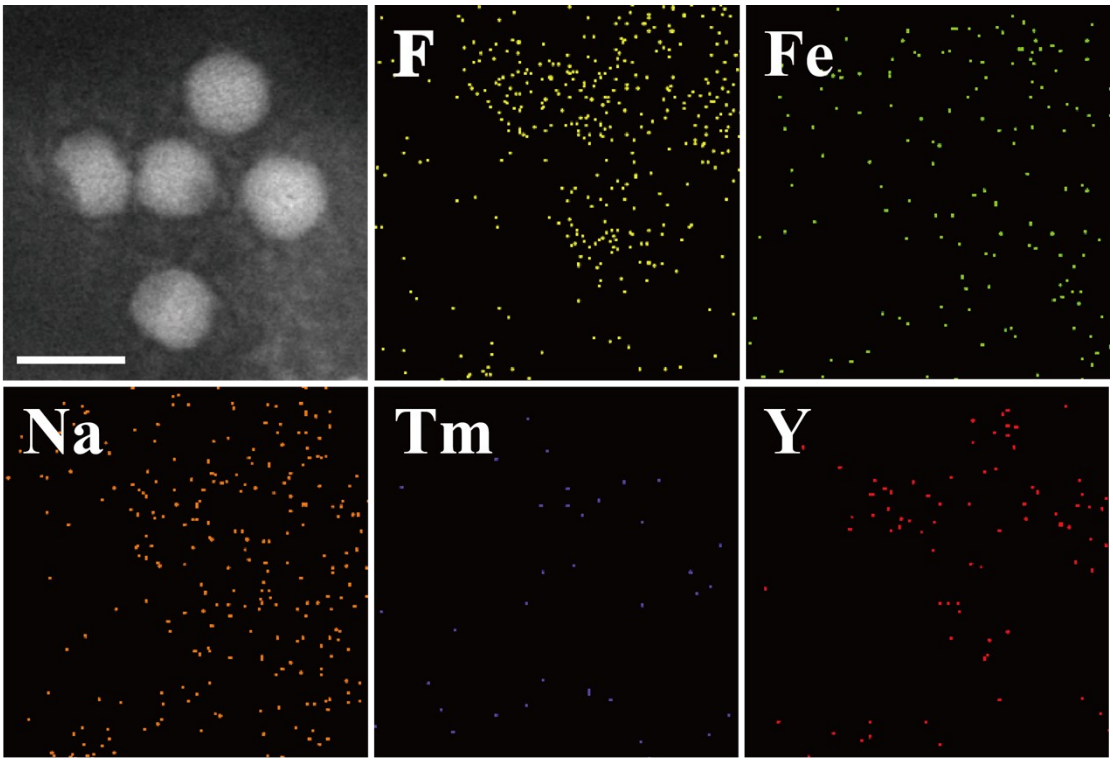

Figure S4. The corresponding elemental mapping images (elemental color distribution) of UmPF nanoplatform. Scale bar: 50 nm

UmPF is unstable under high current impact, it will collapse during the data collecting process, thus the elements distribution does not congregate as the regular shape. However, Figure S4 can still solidate the existence of Fe element, which substantiates the successful loading of $Fe(CO)_5$ in UmPF.

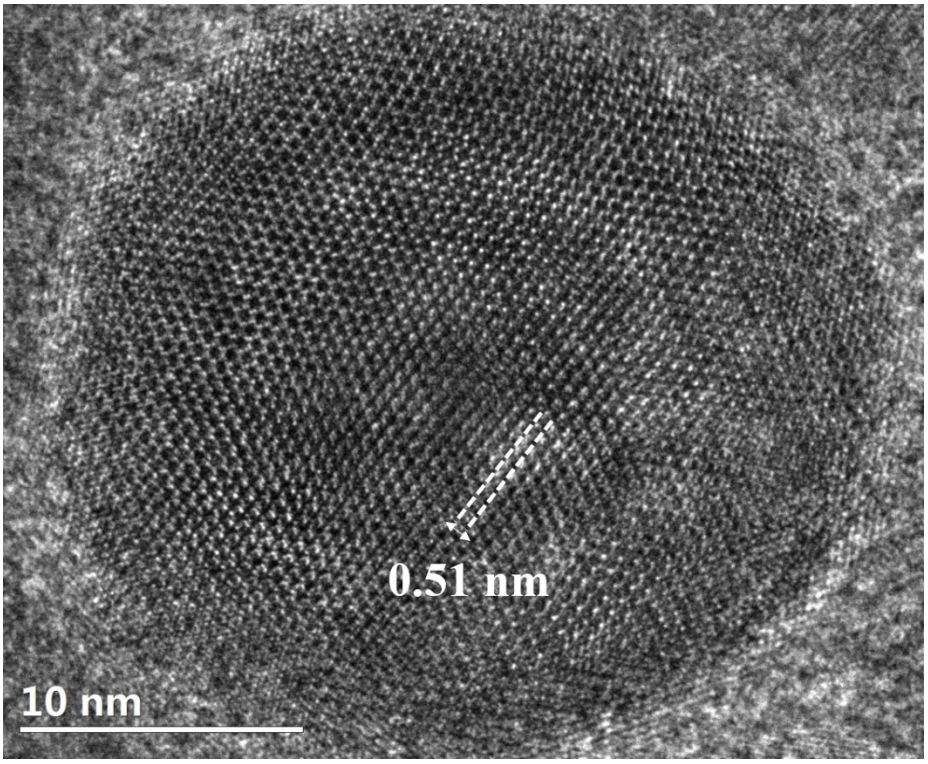

Figure S5. High Resolution Transmission Electron Microscope (HRTEM) of UmPF nanoplatform and its interplanar space.

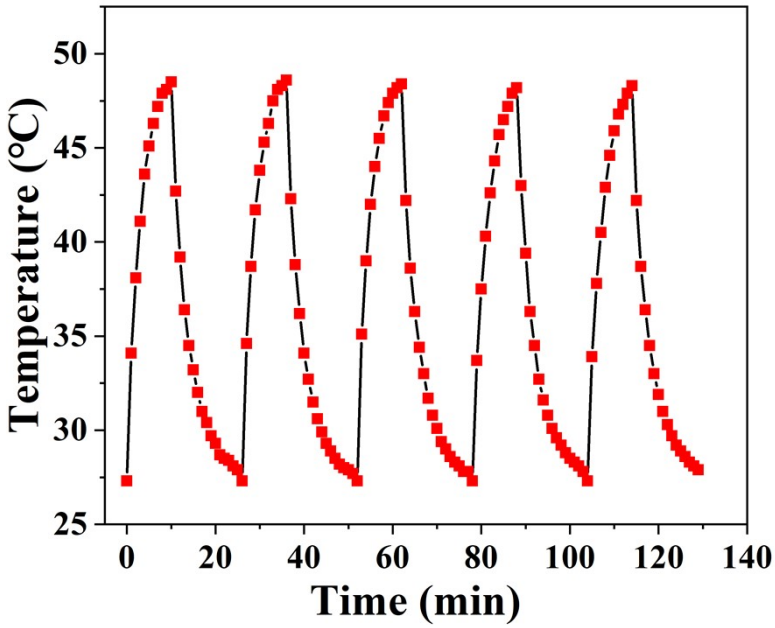

Figure S6. Photothermal stability test of UmPF nanoplatform. The UmPF water dispersion (400 μg/mL) was irradiated under 980 nm laser (1.5 W/cm^2) for 5 min, then cool it down to the room temperature naturally, repeat for 5 times.

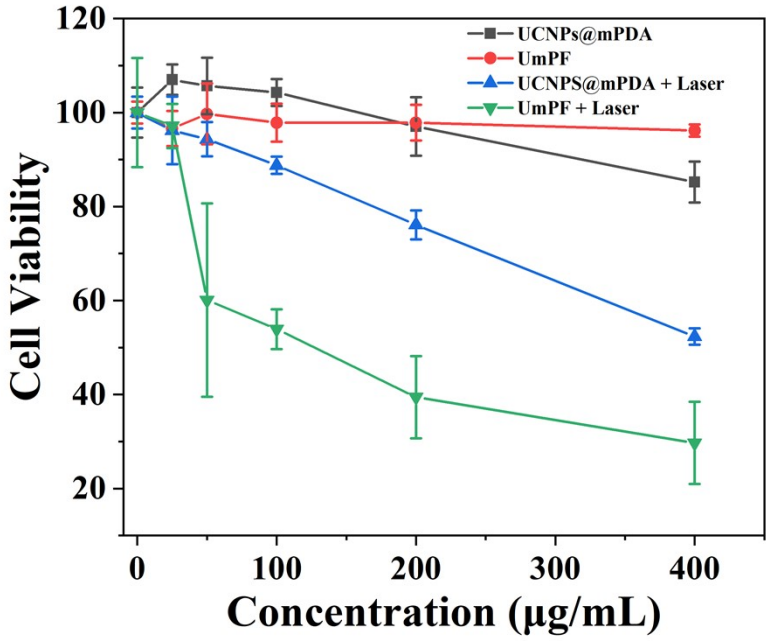

Figure S7. Cell viabilities of HeLa cells incubated with UCNPs@mPDA and UmPF, as well as plus laser irradiation for 10 min, respectively (980 nm laser, 1.5W/cm^2).

In order to calculate the concentration of the released CO, the Lambert-Beer law was used to quantify the concentration of HbCO:

$$\frac{I^{410nm}}{I^{430nm}} = \frac{\varepsilon_{Hb410nm} * (1-x) + \varepsilon_{HbCO410nm} * x}{\varepsilon_{Hb430nm} * (1-x) + \varepsilon Hb_{CO430nm} * x}$$

$$\therefore \quad x = \frac{\varepsilon_{Hb430nm} * I^{410nm} - \varepsilon_{Hb410nm} * I^{430nm}}{(\varepsilon_{Hb430nm} - \varepsilon_{HbCO430nm}) * I^{410nm} - (\varepsilon_{Hb410nm} - \varepsilon_{HbCO410nm}) * I^{430nm}}$$

I^{410nm} and I^{430nm} represents the intensities of the collected UV absorbance spectrum at 410 nm and 430 nm, respectively.

According to references (E. Antonini, M. Brunori, Hemoglobin and myoglobin in their reactions with ligands. Amsterdam, Netherlands: North Holland Publishing Company; 1971a. Solution properties of myoglobin and hemoglobin; pp. 98-134.)

$\varepsilon_{Hb430nm} - \varepsilon_{HbCO430nm} = 216.5\ mM^{-1}cm^{-1}$

$\varepsilon_{Hb410nm} - \varepsilon_{HbCO410nm} = -442.4\ mM^{-1}cm^{-1}$

$\varepsilon_{Hb430nm} = 528.6\ mM^{-1}cm^{-1}$

$\varepsilon_{Hb410nm} = 304\ mM^{-1}cm^{-1}$

[http://omlc.org/spectra/hemoglobin/summary.html]

$$\therefore C_{CO} = C_{Hb} * x = \frac{528.6 * I^{410nm} - 304 * I^{430nm}}{216.5 * I^{410nm} + 442.4 * I^{430nm}} * C_{Hb}$$