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Supporting Information

Zeolitic imidazole framework coated Au nanorods for enhanced photothermal therapy and stability

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1. Materials

Gold(III) chloride trihydrate ($HAuCl_4 \cdot 3H_2O$), silver nitrate ($AgNO_3$), ascorbic acid 99%, sodium borohydride ($NaBH_4$), dimethyl sulfoxide (DMSO), polyvinyl pyrrolidone (PVP), 2-methylimidazole and $Zn(NO_3)_2 \cdot 6H_2O$ were purchased from Beijing Chemical Plant (China). 3-(4,5-Dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT), cetyltrimethylammonium bromide (CTAB) and dopamine hydrochloride were all from Sigma–Aldrich (USA).

2. Synthesis of AuNRs

The Au nanorods were synthesized by the seed-mediated method. First, a gold seed solution was prepared by the borohydride reduction of 0.25 mM $HAuCl_4$ in an aqueous 0.1 M CTAB solution. Subsequently, the seed solution was added to a 10.0 ml growth solution containing 0.1 M CTAB, 0.5 mM $HAuCl_4$, 0.7 mM ascorbic acid and 0.06 mM silver nitrate. The solution was aged for 24 h to ensure the complete formation of AuNRs. The as-synthesized AuNRs were treated with PVP solution over night at room temperature.

3. Synthesis of AuNRs@ZIF-8

5 mL of AuNRs, 0.1 mL of 2-methylimidazole (0.556 M), and 0.1 mL of $Zn(NO_3)_2 \cdot 6H_2O$ (0.278 M) were mixed and stirred at 15 °C for 3 h. Afterwards, the mixture solution was placed at room temperature without stirring for allowing growth of ZIF-8 on the surface of the AuNRs. After grown for 12 h, the solid products were collected via centrifugation. Finally, the products were washed with methanol for several times, and then dried at 300 °C for 3 h.

4. General characterization

The morphology and size of the synthesized nanoparticles were observed using transmission electron microscopy (TEM), which was conducted on a JEM-2100F electron microscope at 200 kV (JEOL, Japan). UV-Vis absorption spectra were obtained by using a UV1900 spectrophotometer (Pgeneral, China) at room temperature under ambient conditions.

5. Photothermal Effect of AuNRs and AuNRs@ZIF-8

Solutions of AuNRs and AuNRs@ZIF-8 were irradiated by using an 808 nm NIR laser (Sfolt Co., Ltd, Shanghai, China) for 10 min with a power density of 2.0 W cm^{-2}. The temperature was measured one time per 1min. The photothermal cycling of AuNRs and AuNRs@ZIF-8 were tested under the same condition, after irradiated for 10 min, the solution of AuNRs or AuNRs@ZIF-8 was placed at room temperature for 15 min to cool down, as cycle 1. After that, another two cycles was tested to compare the photothermal stability of AuNRs and AuNRs@ZIF-8.

6. In vitro cytotoxicity of AuNRs and AuNRs@ZIF-8

In order to investigate the in vitro cytotoxicity of AuNRs and AuNRs@ZIF-8, a typical MTT cell assay has been performed. Briefly, Michigan Cancer Foundation-7 (MCF-7) cells were seeded in a 96-well plate with a rate of 5000–6000 cells per well, and then incubated overnight under a humidified atmosphere of 5% CO_2. After the cells attached to the wells, different concentrations of AuNRs and AuNRs@ZIF-8 were added to each well of the 96-well plate, followed by further incubation for another 24 h. It is worth noting that, for the photothermal heating experiments, a fresh culture medium was added into each well after the incubation of AuNRs or AuNRs@ZIF-8 for 4 h in order to remove excess AuNRs or AuNRs@ZIF-8 nanoparticles. Then the cells were exposed to 808 nm NIR light (2.0 W/cm^{-2}) for 5 min to achieve photothermal treatments. After

incubation for another 24 h at 37 °C with 5% CO_2, 20 μL of the as-prepared MTT solution (5.0 mg/mL) was carefully added into each well. Then the plates were incubated for another 4 h at 37 °C. After removing the original culture medium, 150 μL of DMSO was added into each well and placed on a shaking table for 5 min of 150 rpm in order to blend the formazan and solvent completely. The final surviving fraction of MCF-7 cells was measured by using a microplate reader at a wavelength of 490 nm. The optical density when treated with pure culture medium was regarded as 100% growth.

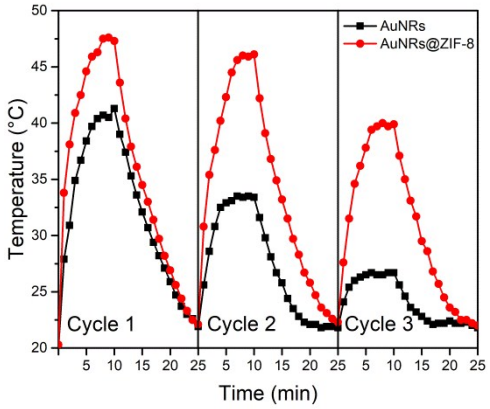

Figure S1. The photothermal cycling tests of AuNRs and AuNRs@ZIF-8 (808 nm, 2 W cm^{-2}).