

Supporting Information

Laser-induced photoexcited audible sound effect based on reticular 2-Bromo-2-methylpropionic acid modified Fe₃O₄ nanoparticle aggregates

1. Preparation of Fe₃O₄ nanoparticles, BMPA modified Fe₃O₄ nanoparticles, and reticular BMPA modified Fe₃O₄ nanoparticle aggregates

1.1 Preparation of Fe₃O₄ nanoparticles

Fe₃O₄ nanoparticles were prepared via solvothermal process³³. First, 0.706 g of Fe(acac)₃, 3 mL of OA, 3 mL of OM, and 20 mL of benzyl alcohol were mixed at room temperature with a magnetic stirrer for 30 min until a uniform mixture formed. The mixture was transferred into a Teflon bottle (100 mL), sealed, and maintained at 180 °C for 10 h. When the autoclave cooled to room temperature, excess ethanol and water were used for alternate washing. Fe₃O₄ nanoparticles were obtained after being isolated by centrifugation.

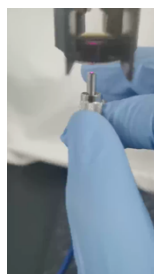
1.2 Preparation of BMPA Fe₃O₄ modified nanoparticles

BMPA modified Fe₃O₄ nanoparticles were fabricated according to a previously reported method with slight modification of the solvent ratio³⁴: a mixture of Fe₃O₄ nanoparticles (60 mg), BMPA (2 g), and citric acid (0.2 g) was dispersed in 30 mL of chloroform-DMF (v/v=1:1) solution. BMPA modified Fe₃O₄ nanoparticles were obtained after continuous stirring for 24 h at room temperature.

1.3 Preparation of reticular BMPA modified Fe₃O₄ nanoparticle aggregates

Reticular BMPA modified Fe₃O₄ nanoparticle aggregates were prepared by an 808 nm CW laser-induced process. BMPA modified Fe₃O₄ nanoparticles (25 mg) were dispersed in double-distilled water (5 mL) and ultrasonicated for 30 min. Reticular BMPA modified Fe₃O₄ nanoparticle aggregates were obtained after irradiation with an 808 nm laser for over 5 min.

2. Video information



video 1.mp4

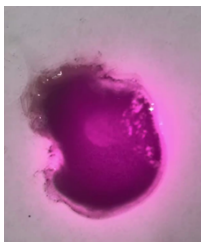
Video1. BMPA modified Fe₃O₄ nanoparticle aggregates produce Photoexcited Audible Sound Effect under 1 W, 808 nm CW laser.





video 2.mp4

Video 2. BMPA modified Fe_3O_4 nanoparticle aggregates were irradiated by a 100 mW portable small CW laser to produce Photoexcited Audible Sound Effect.



video 3.mp4

Video 3. Laser-induced aggregation of BMPA modified Fe_3O_4 nanoparticle.

3. Supplement figure



Figure S1 Photo of BMPA modified Fe_3O_4 nanoparticle aggregates (before magnetic response).



Figure S2 Photo of BMPA modified Fe_3O_4 nanoparticle aggregates (after magnetic response).

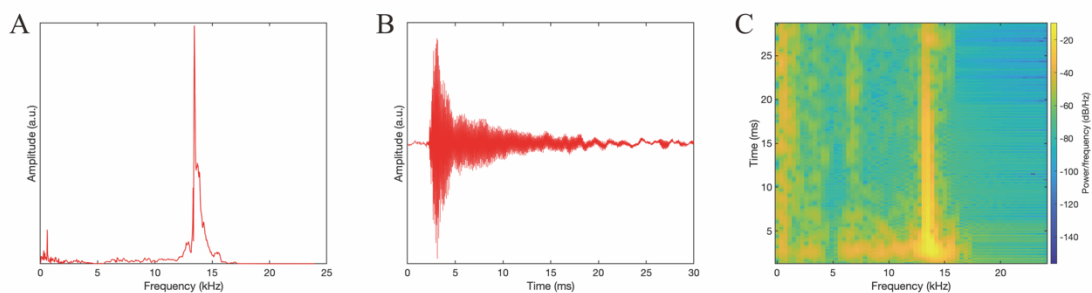


Figure S3 PEAS signals generated by BMPA modified Fe_3O_4 nanoparticle aggregates with Water/Ethanol=2:1 as solvent (collected under CW laser irradiation of 1 W and 808 nm)

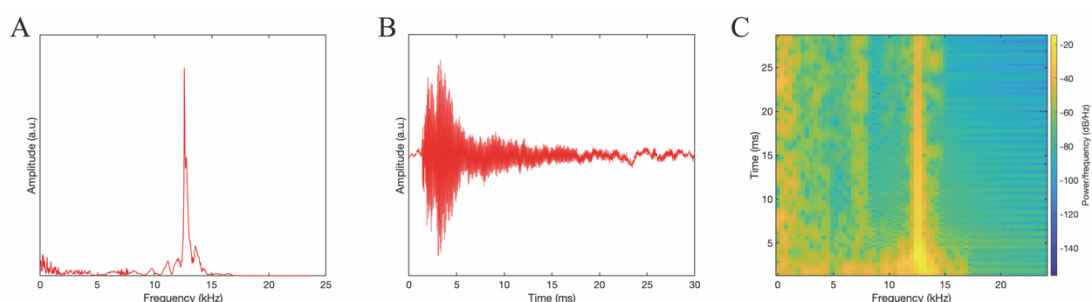


Figure S4 PEAS signals generated by BMPA modified Fe_3O_4 nanoparticle aggregates with Water/Ethanol=1:1 as solvent (collected under CW laser irradiation of 1 W and 808 nm)

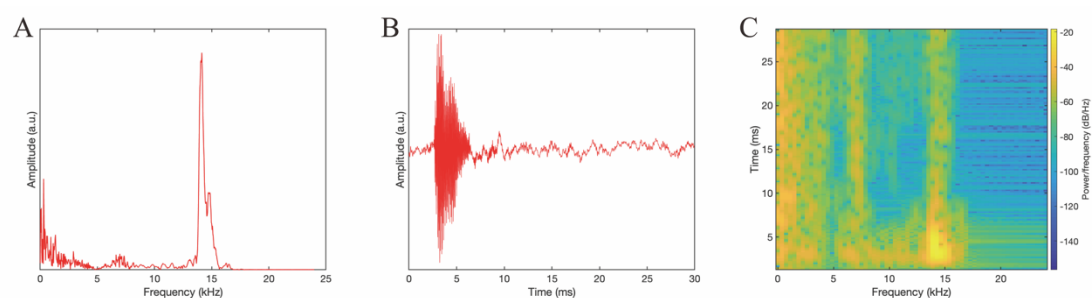


Figure S5 PEAS signals generated by BMPA modified Fe_3O_4 nanoparticle aggregates with Water/Ethanol=1:2 as solvent (collected under CW laser irradiation of 1 W and 808 nm)

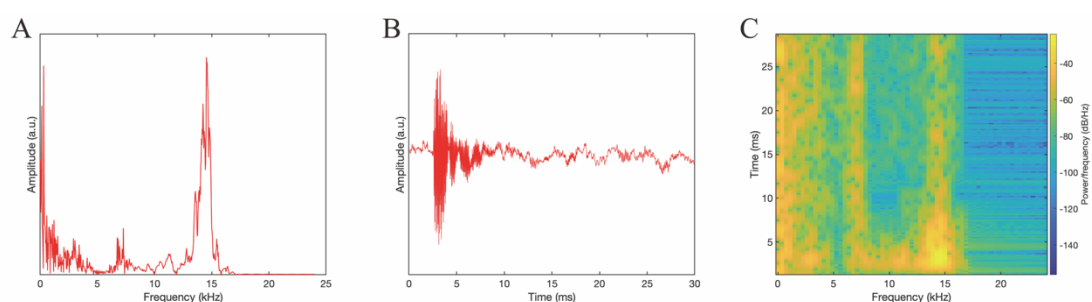


Figure S6 PEAS signals generated by BMPA modified Fe_3O_4 nanoparticle aggregates with Ethanol as solvent (collected under CW laser irradiation of 1 W and 808 nm)

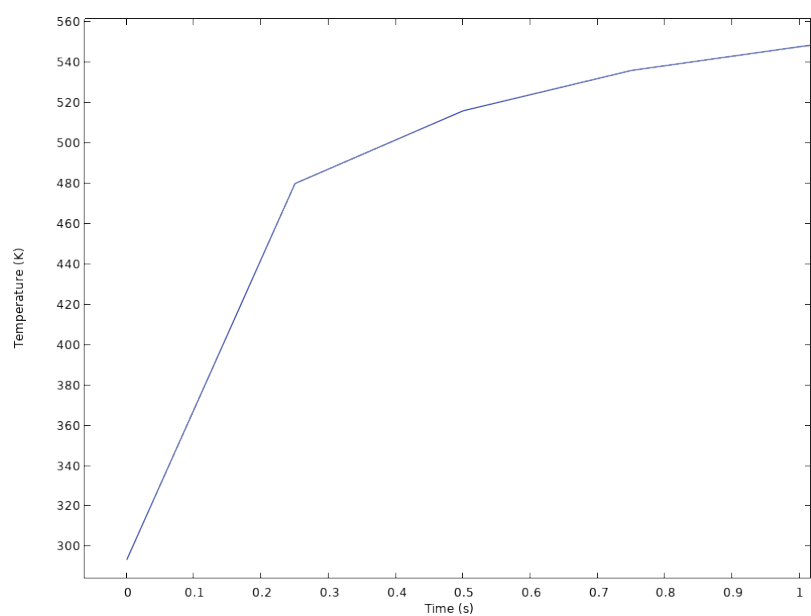


Figure S7 heat transfer property of BMPA modified Fe_3O_4 nanoparticle aggregates. Plot of center temperature versus time.