Electronic Supplementary Material

Magnetic-chemotactic hybrid microrobots with precise remote targeting accuracy

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Electronic Supporting Material include:

Note S1 Preparation of the ZnO/Fe-Ag JMRs.
ZnO MPs were dispersed in ethanol to obtain 35 mg/mL suspension, then 50 μL suspension was added onto 25*25 mm slide to obtain ZnO MPs monolayer (Figure S1). After ethanol evaporation, the ZnO MPs were sequentially coated with Fe and Ag for 40 and 20 s, corresponding to ~ 12 and 5 nm of Fe and Ag layer on the ZnO MPs, respectively. Then the slides were sonicated in ethanol to release the JMRs from substrate, washed with ethanol and water 3 times and carefully dried in 40 ℃ oven, finally the JMRs were made into 10 mg/mL suspension for further use.

Note S2 Preparation and use of agar gel.
2 g agar powder was added to 40 g boiling DI water and stirred until completely dissolved, the solution was transferred into a 50 mL tube for cooling down to form agar gel. Then the gel was cut into 3*3*3 mm cube, immersed in boiled DI water and pH =5.98 CO2 solution, respectively. When used, the agar gel was taken and gently wiped with Kimwipes to remove surface solution before added to microrobot suspension.

Note S3 Homemade microcell for chemical propulsion of the JMRs.
Microcell for chemical propulsion of the JMRs were made by attaching a tailored rubber ring (16 mm inner diameter, 3 mm in height) onto glass slide through double-sided tape.

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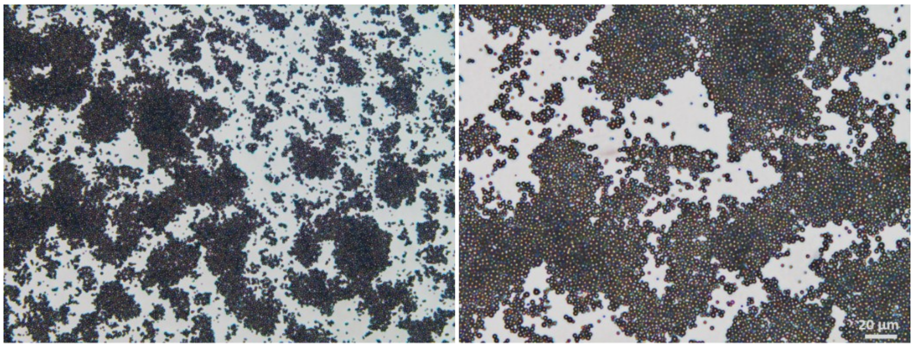

Figure S1 ZnO microparticle monolayer on glass substrate.

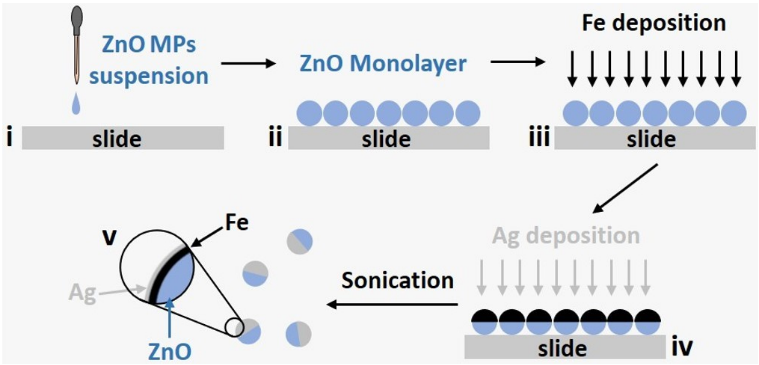

Figure S2 Schematic illustration of the fabrication process of the ZnO/Fe-Ag JMRs.

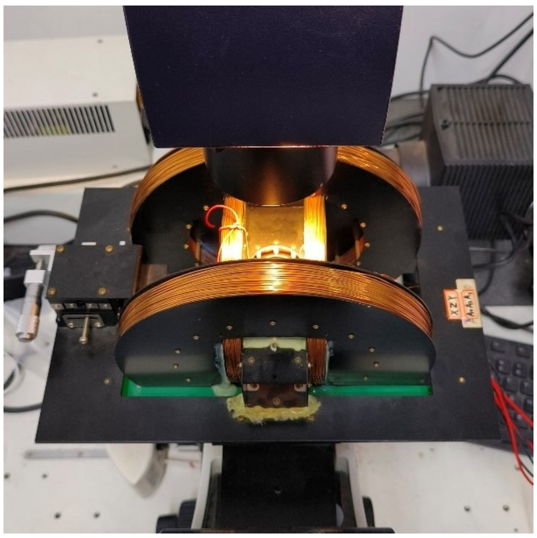

Figure S3 Homemade 3D Helmholtz coil mounted on inverted optical microscope for magnetic propulsion of the JMRs.

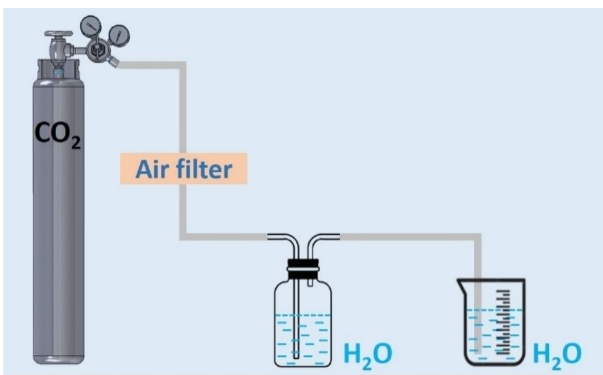

Figure S4 Preparation of pH = 5.98 CO_2 solution.

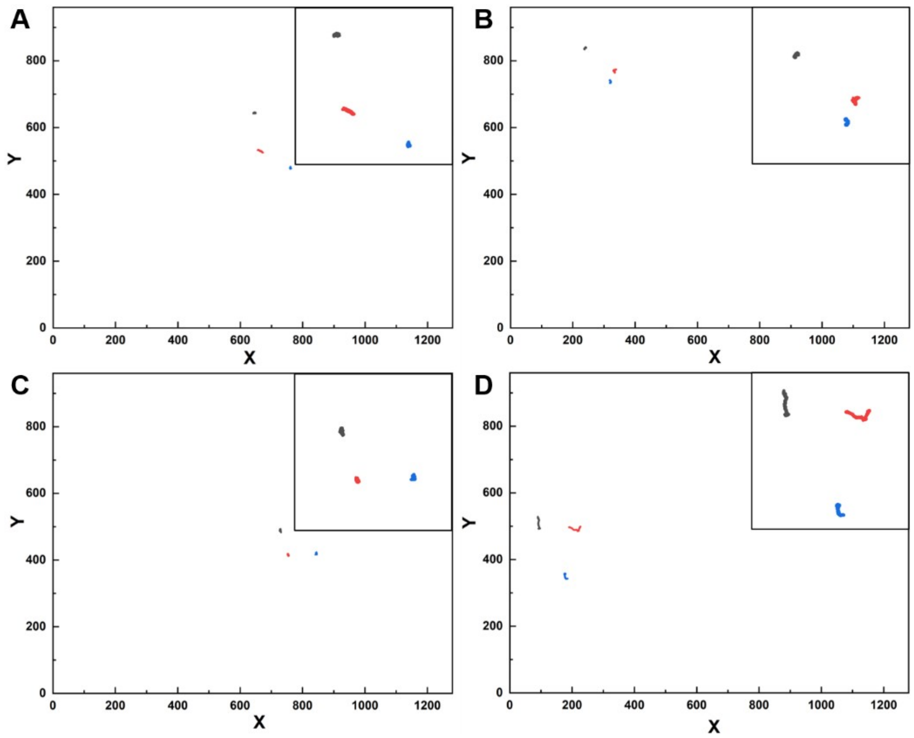

Figure S5 Trajectories of ZnO/Fe-Ag JMRs in fresh B-water after being exposed to air for (A) 0, (B) 5, (C) 10 and (D) 30 min. All trajectories correspond to a time duration of 20 s.

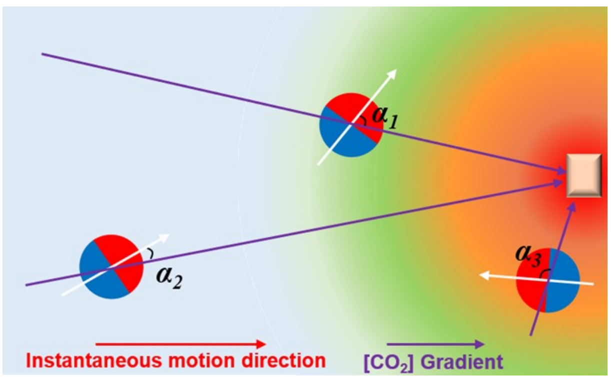

Figure S6 Orientation of the JMRs moving in [CO_2] gradient.

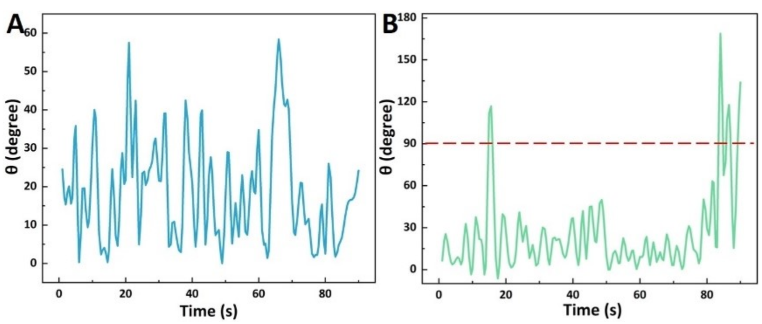

Figure S7 α of two typical JMRs displaying positive chemotactic behaviors.

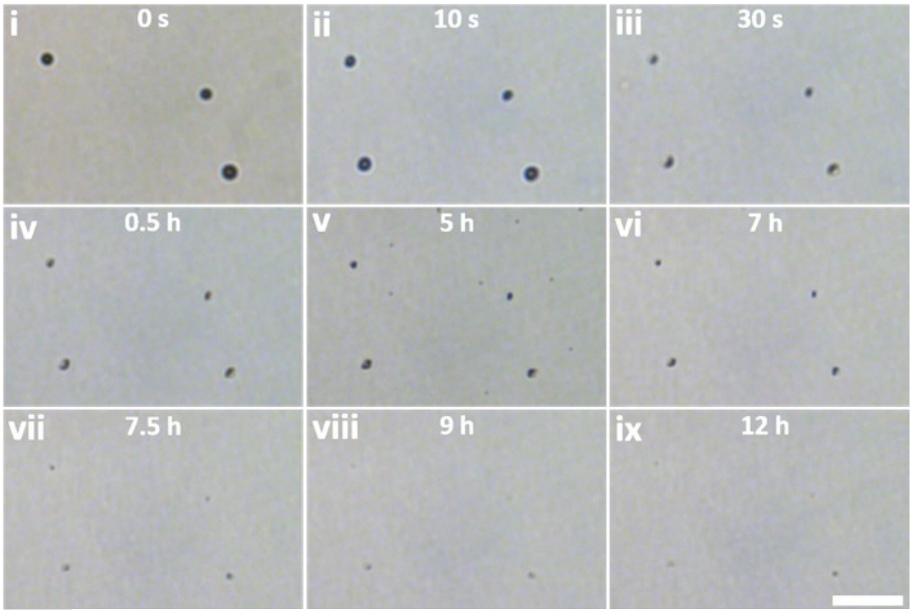

Figure S8 Degradation of the ZnO/Fe-Ag JMRs in simulated gastric acid. Scale bar, 20 µm.