

# Supporting Information

## Magnetic biohybrid micromotors with high maneuverability for efficient drug loading and controlled release

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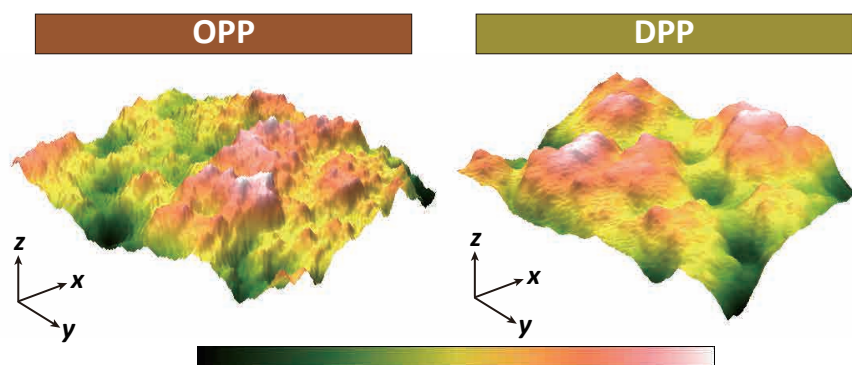
Email: xiehui@hit.edu.cn.

**Video S1.** Magnetic propulsion of an individual micromotor in three motion modes (i.e., rolling, spinning and tumbling).

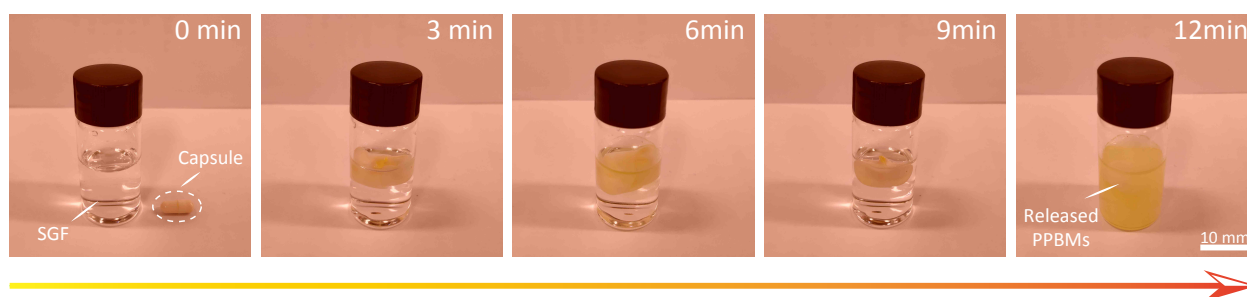
**Video S2.** Programmable navigated locomotion of individual micromotor in the bright and fluorescence mode.

**Video S3.** Multiple micromotors swimming as a team and controllable swarm locomotion.

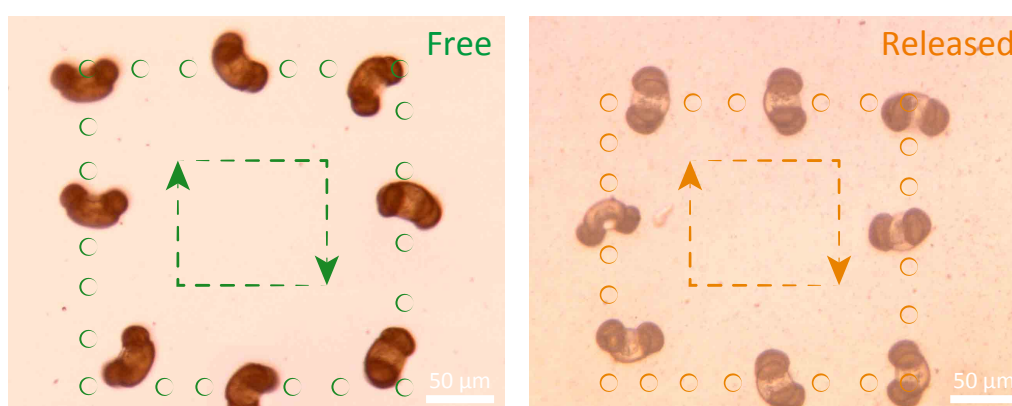
**Video S4.** Controllable rotation of magnetic agglomerate inside the air sac by regulating the input magnetic field.



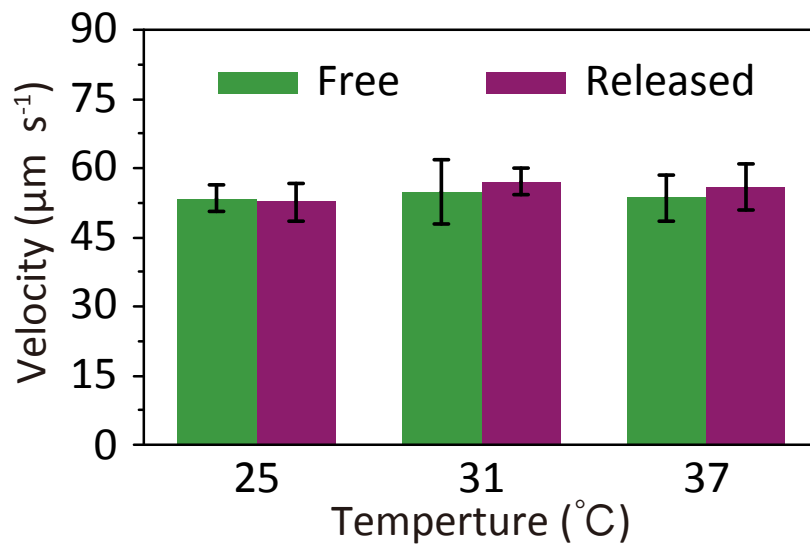
**Figure 1.** 3D AFM images of the hollow air sac surface of OPP and DPP.



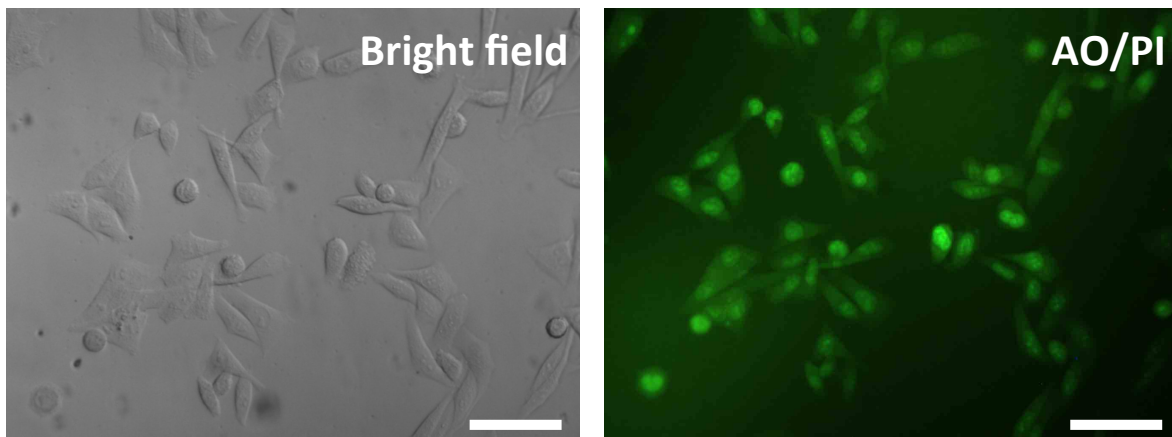
**Figure 2.** The whole process of dissolution of gastric-soluble capsules containing PPBM in the SGF media. And the released PPBM still keep stable morphology. Scar bar, 10 mm.



**Figure 3.** Time-lapse images displaying the navigated locomotion of free PPBM (left) and released PPBM from gastric-soluble capsule (right) in SGF. Scar bars, 50  $\mu\text{m}$ .



**Figure 4.** Comparison of the average velocities of free and released PPBMs in SGF at 25, 31 and 37 °C.



**Figure 5.** Control cell images without DOX-loaded PPBM. Scar bars, 50 μm.