Supporting Information

Controllable Microfluidic Fabrication of Magnetic Hybrid Microswimmers with Hollow Helical Structures

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Part I. Supplementary Figures S1-S4

Part II. Supplementary Movies S1-S2

Part I. Supplementary Figures S1-S4

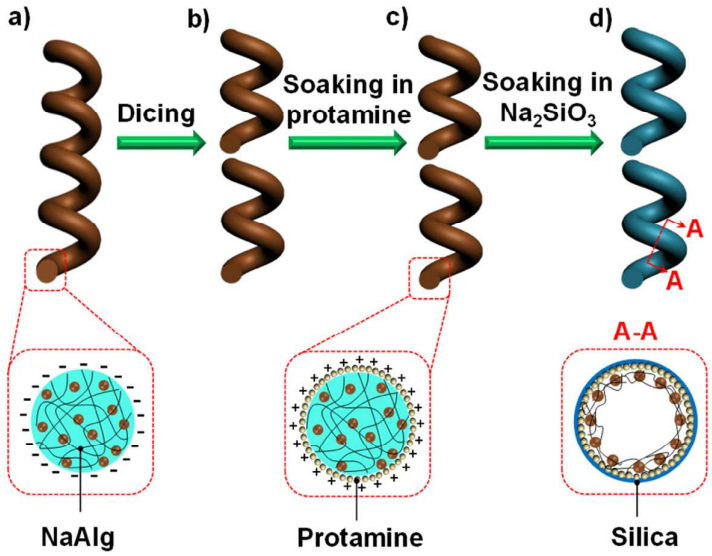

Figure S1. Schematic illustration for fabrication of magnetic hybrid microswimmers with hollow helical shapes consisting of closed compartmental structure. (a-d) Controlled dicing of the magnetic helical microfibers (a-b), followed with biosilicification via two sequential soaking steps for protamine coating (c), and then silica coating and Ca-Alg decomposition (d) to create the magnetic hybrid microswimmers with closed compartment.

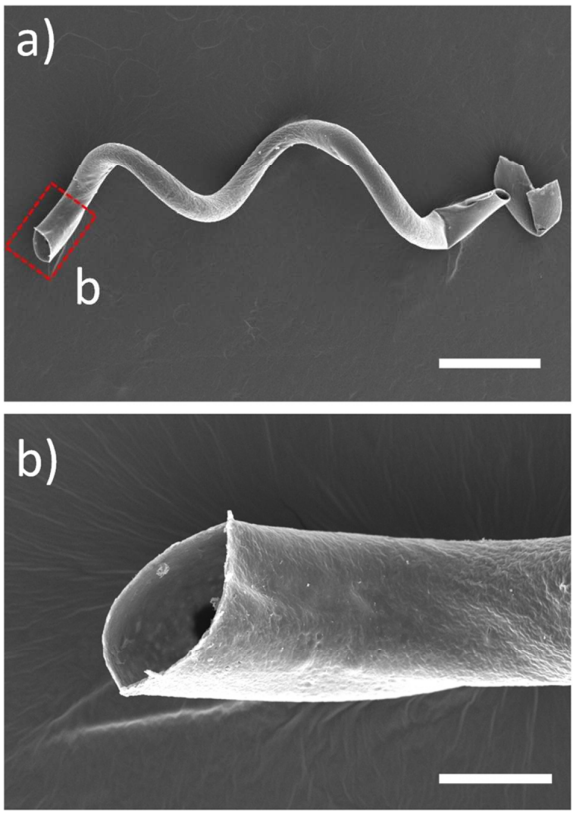

Figure S2. SEM images of a magnetic hybrid microswimmer (a) with hollow helical shape containing open tubular structure (b). Scale bars are 250 μm in (a) and 50 μm in (b).

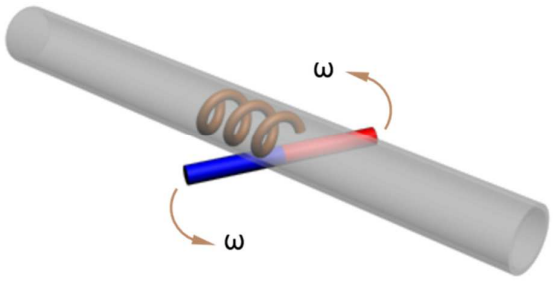

Figure S3. Schematic illustration showing the setup of the capillary device and the permanent magnet for studying the rotation-based locomotion of magnetic hybrid microswimmers.

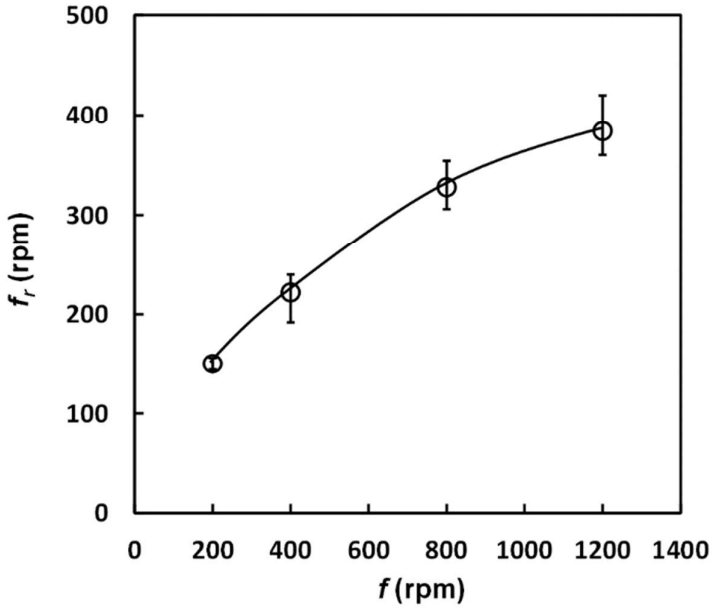

Figure S4. Effect of rotating frequency of the magnet (f) on the rotating frequency of the magnetic hybrid microswimmer (f_s). For the locomotion, μ= 1.03 mPa·s, pitch= 720 μm, and C_{MNPs}= 5 wt%.

Part II. Supplementary Movies S1-S2

Movies S1: Rotation-based Locomotion of Magnetic Hybrid Microswimmer in a Capillary

Movies S2: Magnetic Hybrid Microswimmer for Cargo Transport