

SUPPLEMENTARY INFORMATION

Self-propelled liquid metal motors steered by magnetic or electrical field for drug delivery

Jie Zhang¹, Rui Guo¹, Jing Liu^{1,2*}

1. Department of Biomedical Engineering, School of Medicine, Tsinghua University, Beijing 100084, China

2. Technical Institute of Physics and Chemistry, Chinese Academy of Sciences, Beijing 100190, China

*E-mail Address: jliubme@tsinghua.edu.cn

1. **Movie S1.**

Ni/EGaIn droplet is dragged by a magnet in a straight channel or a Petri dish containing 0.1 mol/L NaOH.

2. **Movie S2.**

Bubbles evolve on the Ni cap of Ni/EGaIn droplet in 0.1 mol/L and 0.25 mol/L NaOH solution.

The Ni/EGaIn droplet is deformed under exposure of electric field in 0.1 mol/L NaOH solution.

The Ni/EGaIn droplet swallows Al film with the release of numerous bubbles on Ni cap in 0.1 mol/L NaOH solution. Then the Ni cap sticks on the liquid metal much more tightly.

3. **Movie S3**

The Ni/EGaIn droplet is deformed under exposure of 15 V voltage in 0.1 mol/L NaOH solution.

4. **Movie S4**

Ni/Al/EGaIn motor and Al/EGaIn motor swim autonomously in a Petri dish containing 0.1 mol/L NaOH as well as Ni/Al/EGaIn motor swims autonomously in a Petri dish containing 0.15 mol/L NaOH.

5. **Movie S5**

The Ni/Al/EGaIn motor swim autonomously in a Petri dish containing 0.15 mol/L NaOH, with

a magnet to control its start-stop behavior and direction or position.

6. Movie S6

In a Y-shaped channel, when the magnet is close to the channel at the intersection (the magnetic field is strong when the motor approaches to the intersection), the motor stops at the intersection. With the removal of the magnet, the motor continues to move autonomously along the magnet side. When the magnet is far from the channel at the intersection (the magnetic field is weak when the motor approaches to the intersection), the motor chooses the direction and moves forward.

7. Movie S7

Ni/Al/EGaIn motor is directionally accelerated under exposure of 15 V voltage in a Petri dish containing 0.1 mol/L NaOH.

8. Movie S8

The Ni/Al/EGaIn motor and Al/EGaIn motor are directionally accelerated under exposure of 18 V voltage in a straight channel containing 0.1 mol/L NaOH as well as Ni/Al/EGaIn motor is directionally accelerated under exposure of 18 V voltage in a straight channel containing 0.25 mol/L NaOH.

9. Movie S9

The Hyd/Ni/Al/EGaIn-Al motor propels itself in 0.2 mol/L NaON solution. The start-stop behavior is achieved by a magnet. Additionally, with the application of external electric field, the self-propelled motor is accelerated directionally for drug delivery.