

Supporting Information for "Leech-Inspired Shape-Encodable Liquid Metal Robots for Reconfigurable Circuit Welding and Transient Electronics

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Supplementary Materials include:

Fig. S1. Snapshots showing the successive shape transformation of a leech.

Fig. S2. Optical photographs of the shape transformation of a liquid metal droplet into a semi-circle with different radians.

Fig. S3. SEM images of the integral and enlarged views of the superhydrophobic petri dish surface.

Fig. S4. SEM images of the integral and enlarged views of the silicon surface.

Fig. S5. Restoration of a damaged circuit.

Movie S1. Leech-inspired liquid metal robots with controlled deformability.

Movie S2. Magnetically controlled splitting of the LM composite robots.

Movie S3. Magnetically controlled coalescence of the LM composite robots.

Movie S4. Reversible phase transition of the liquid metal droplet robot between liquid state and solid state.

Movie S5. Reconfigurable circuit connection with the conductive liquid metal droplet robots.

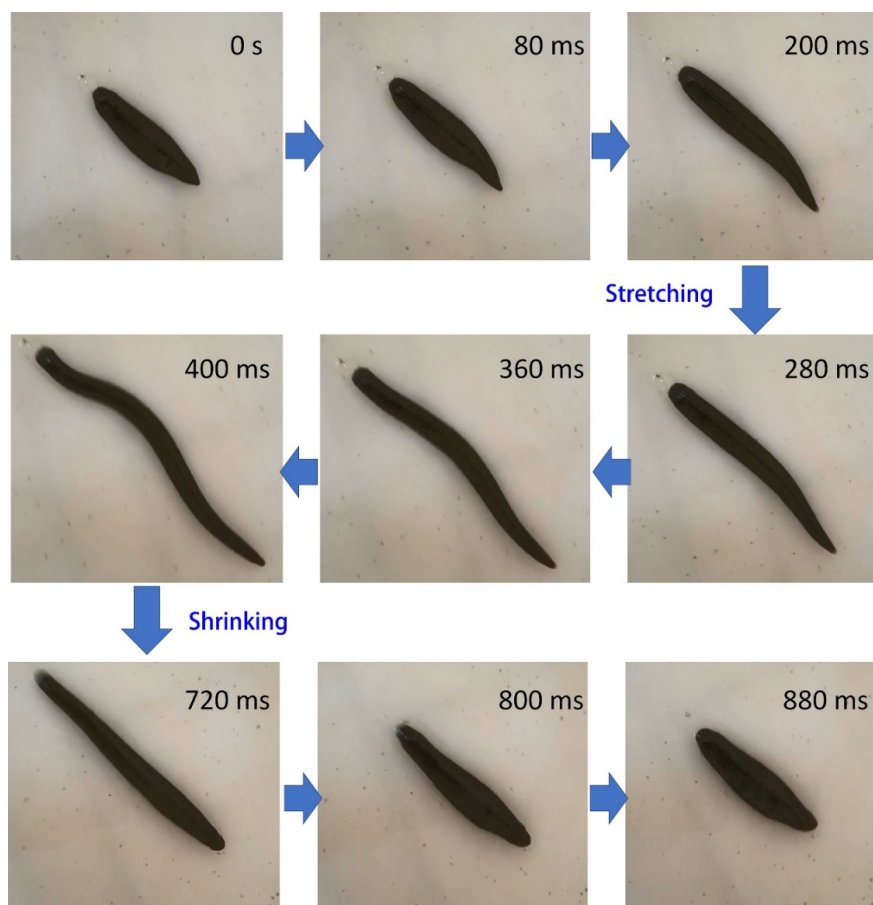


Fig. S1 Snapshots showing the successive shape transformation of a leech.

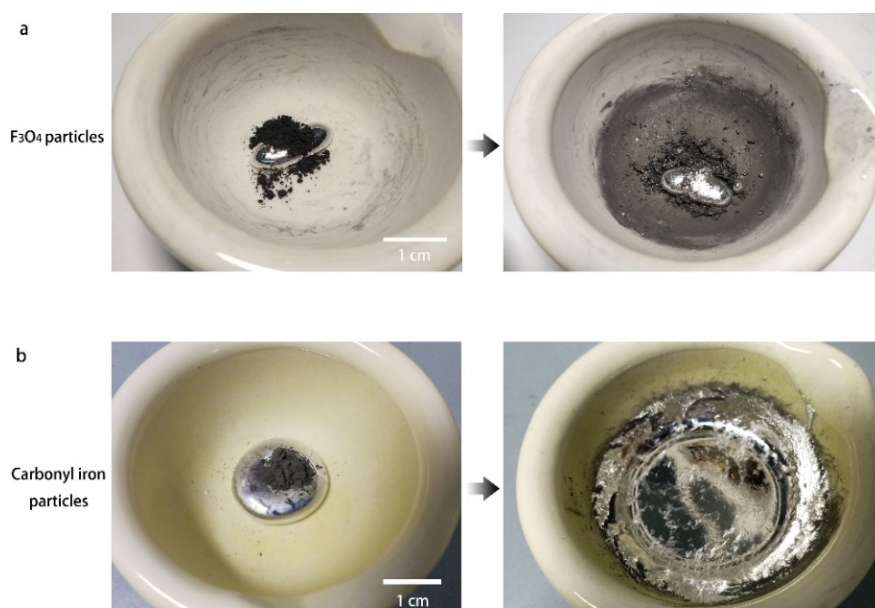


Fig. R2 Photographs showing the dispersibility of Fe_3O_4 particles (a) and carbonyl iron particles (b) with similar size of about $1\sim 5\ \mu\text{m}$ in liquid metal by the grinding and stirring process.



Fig. S3 Optical photographs of the shape transformation of a liquid metal droplet into a semi-circle with different radians.

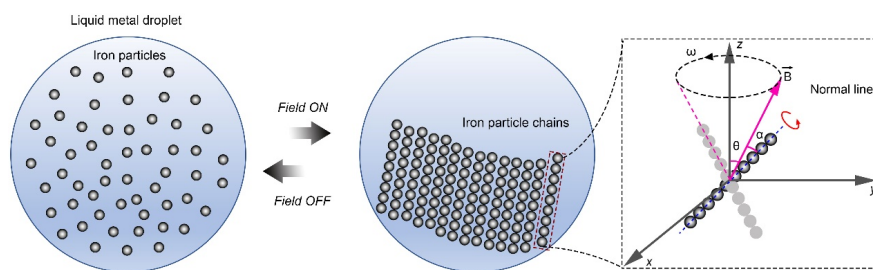


Fig. S4 Schematic showing the reversible assembly of separated rotating particle chains inside the liquid metal droplet with and without magnetic field. The right image showing the microparticle chains are formed under a processing magnetic field with frequency ω , precession angle ϑ and field strength B . α is the phase lag which is the angle between the magnetic field and long axis of the particle chain.

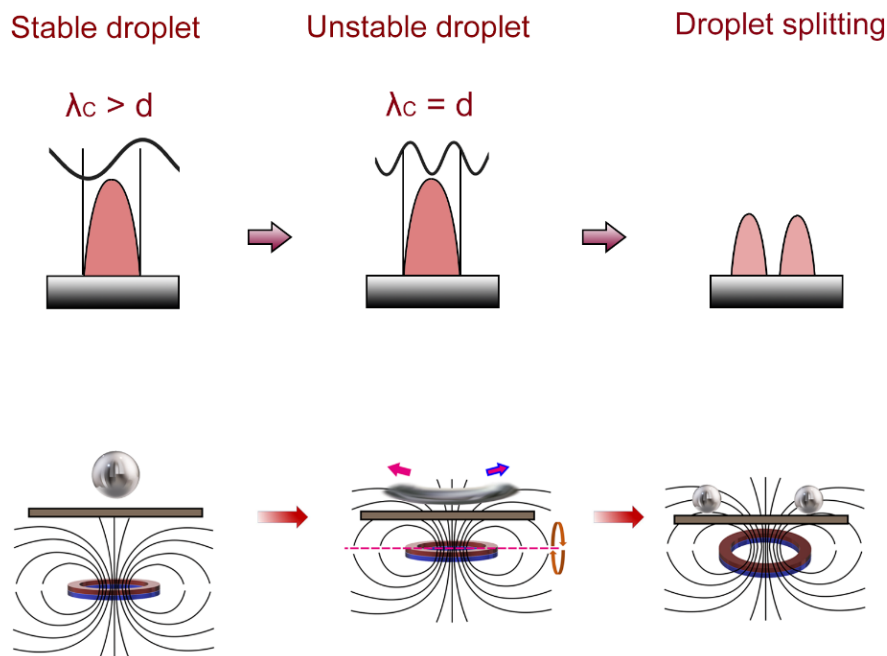


Fig. S5 Schematic showing the splitting instability of magnetic liquid metal droplet. λ_c is critical wavelength and d is diameter.

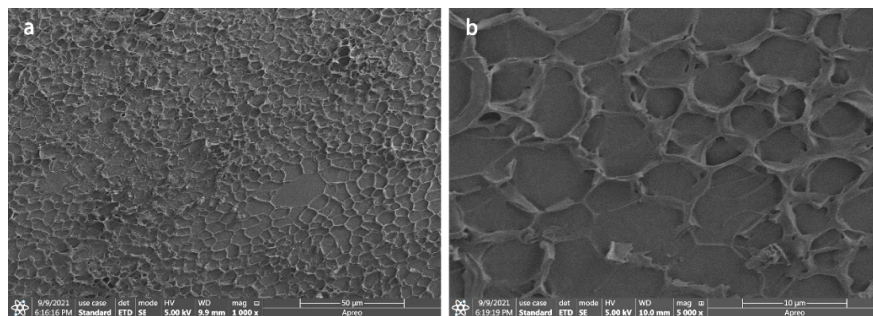


Fig. S6 SEM images of the integral and enlarged views of the superhydrophobic petri dish surface that used in Figure 5.

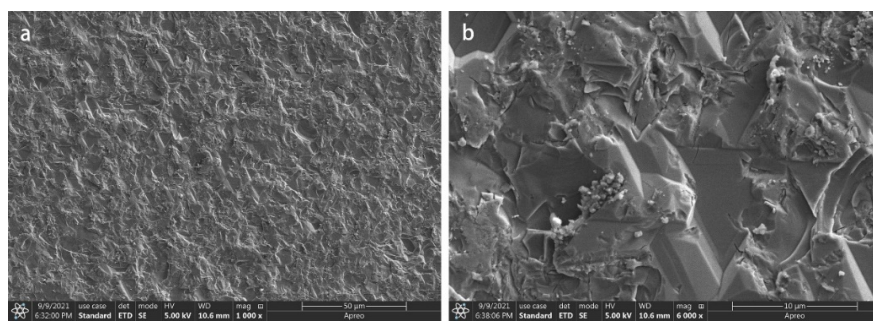


Fig. S7 SEM images of the integral and enlarged views of the silicon surface that used in Figure 5.

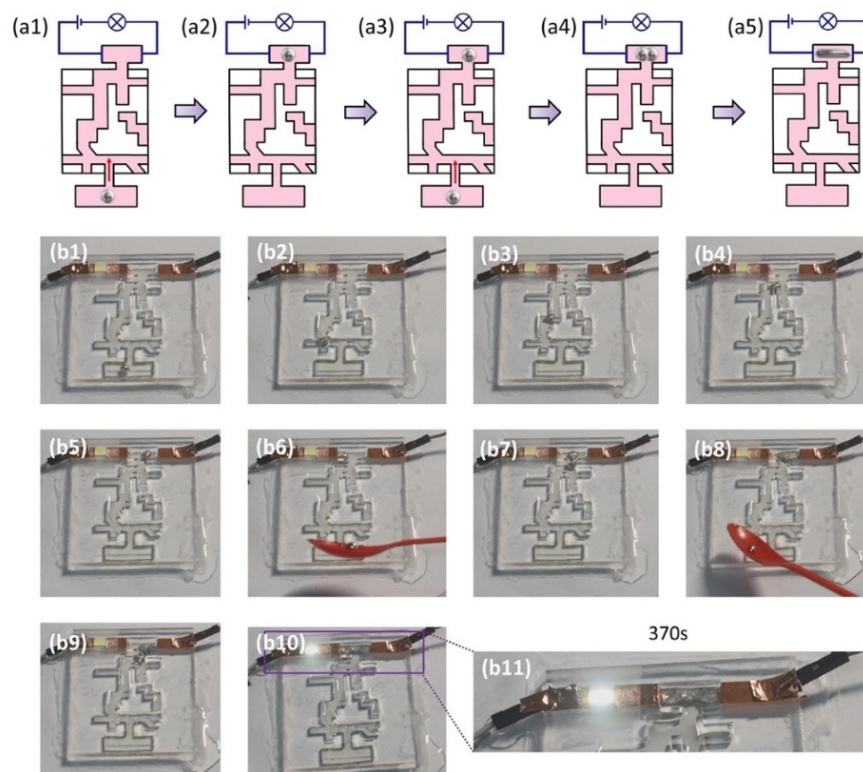


Fig. S8 Restoration of a damaged circuit. (a) Schematic diagram showing the process of the liquid metal soft robot reaching the damaged part and repairing it. (b) Optical image during the actuation and repairing operation: (b1) shows the deployment of the droplet, (b2-b5) show movement of the droplet to the damaged part of the circuit, (b6 and b8) show further deployment of liquid metal robots. (b7 and b9) Actuation of the additional droplets to the damaged circuit. (b10) Repaired circuit and (b11) magnification of the repaired part of the circuit. Light up of the LED signifies a closed circuit.

Rich media available at https://youtu.be/LZyU7YU_pWk

Rich media available at <https://youtu.be/ZWZEFhi2LJ0>

Rich media available at <https://youtu.be/xrxS5zw9tV0>

Rich media available at <https://youtu.be/0u0uKTFBivw>

Rich media available at https://youtu.be/sJgbJew_0B4