Supplementary material:

Al-Assisted High Frequency Self- Powered Oscillations of Liquid Metal Droplets

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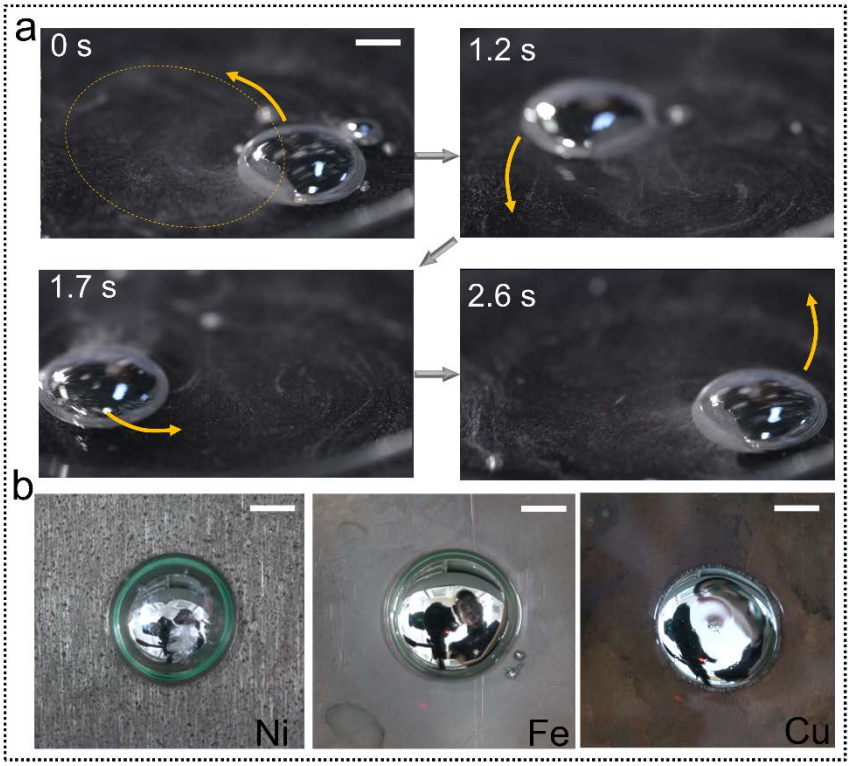

Figure S1. (a) On the glass plate, self-driven motion of liquid metal droplets that have swallowed Al foil occurs. (b) Pure liquid metal droplets can spread spontaneously on the Fe, Ni and Cu plates. Scale bars, 10mm. Here, the amount of liquid metal and Al foil is 2mL and 60mg, respectively.

Table S1. Standard electrode potentials of several metals involved in the study under alkaline conditions. [1]

Reaction	E°/V
$H_2GaO_3^- + H_2O + 3e \rightleftharpoons Ga + 4OH^-$	-1.219
$In(OH)_3 + 3\ e \rightleftharpoons In + 3OH^-$	-0.99
$[Al(OH)_4]^- + 3e \rightleftharpoons Al + 4OH^-$	-2.328
$Ni(OH)_2 + 2\ e \rightleftharpoons Ni + 2OH^-$	-0.72
$Cu(OH)_2 + 2\ e \rightleftharpoons Cu + 2\ OH^-$	-0.222
$Mg(OH)_2 + 2\ e \rightleftharpoons Mg + 2\ OH^-$	-2.690

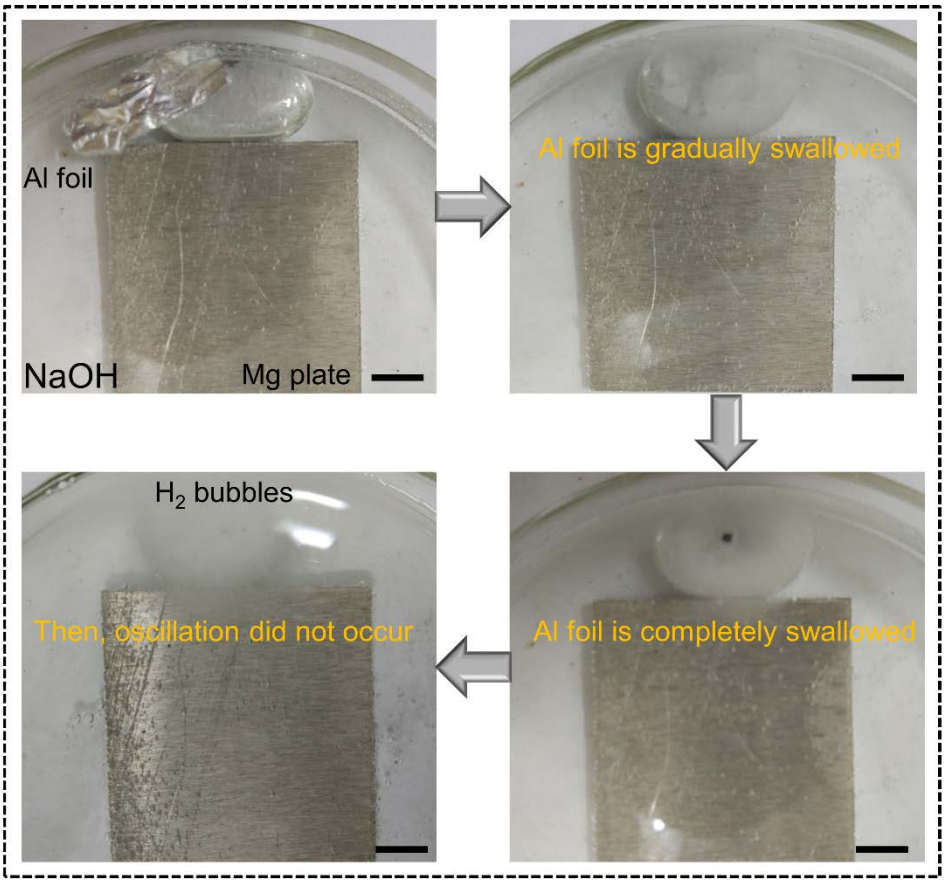

Figure S2. The liquid metal droplet placed on the Mg plate no longer spontaneously oscillates. Scale bars, 10mm. Here, the amount of liquid metal and Al foil is 2mL and 60mg, respectively.

Movie S1.

A movie shows the high frequency oscillation of liquid metal droplets on Fe plates.

Movie S2.

A movie shows the directional self-driven motion of liquid metal droplets on glass plates.

References

1. D. R. Lide, *CRC handbook of chemistry and physics*, CRC press, 2004.