Supporting Information

Magnetic Field Induced Push-Pull Motility of Liquibots

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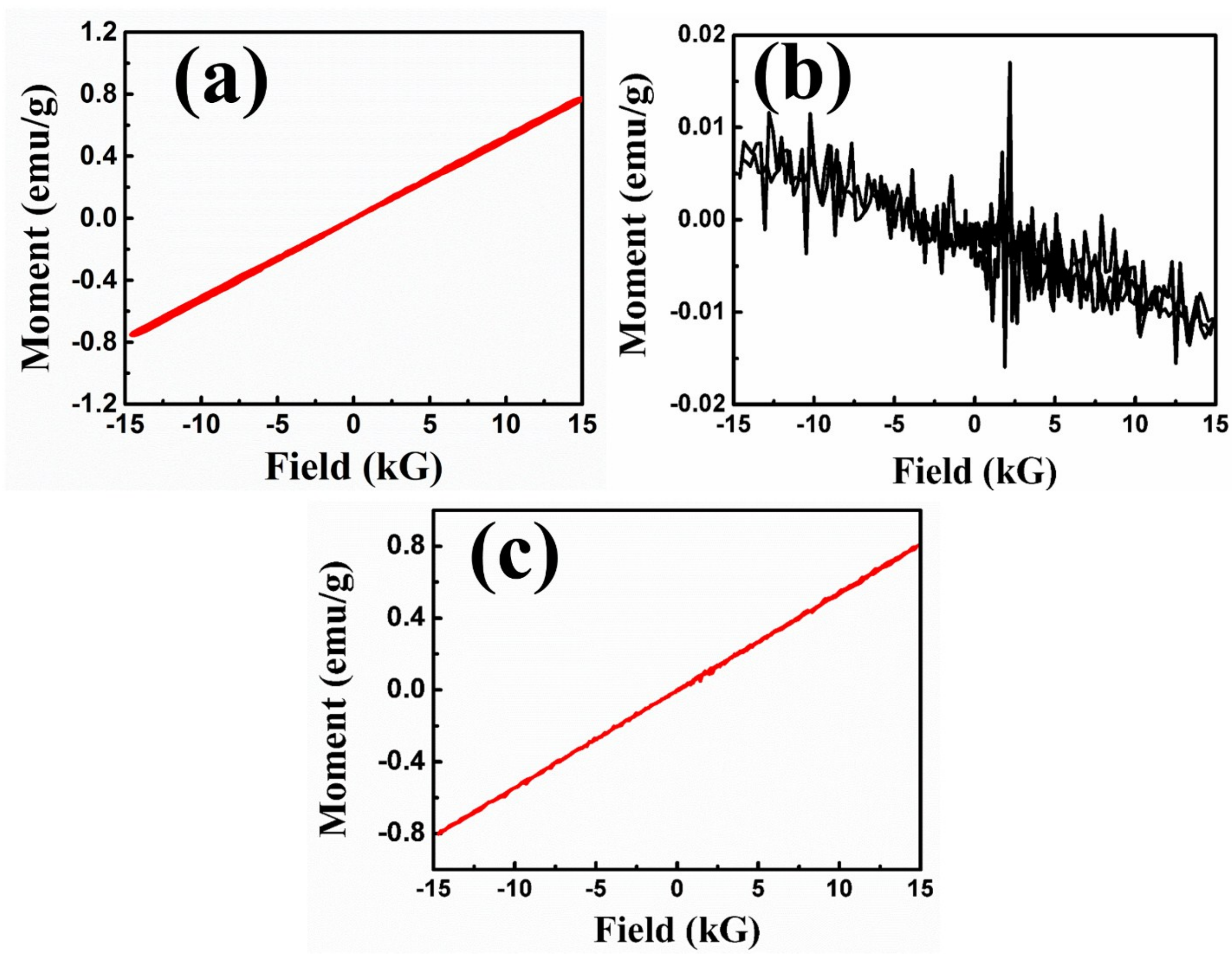

Figure S1. Vibrating sample magnetometry (VSM) hysteresis loop for the aqueous solutions of (a) $MnCl_2$, (b) NaCl, (c) $FeCl_3$

The magnetization curve for the paramagnetic and diamagnetic liquibots were obtained from the VSM data at 25°C by varying the magnetic field from −15 to 15 kG. The magnetization curves with positive slope in **Supporting Figure S1a** show that manganese (II) chloride was paramagnetic but the magnetization curves with negative slope in **Supporting Figure S1b** show that liquibot loaded with sodium chloride was diamagnetic in nature. The other paramagnetic salts $FeCl_3$ also showed paramagnetic behavior, as shown in the **Figure S1(c)**.

Supporting Video 1 – Pull-Push motility: The experimental setup shown in FIG 1 in which 7 ml of chloroform was filled in 40 mm diameter petri dish. After that, 5 µl 0.5 M aqueous manganese chloride waterbot was put on chloroform solution before it was pulled by an external electromagnet. The velocity obtained by the liquid motor was ~3.4 mm/s. In the other experiment, a 5 µl 0.5 M aqueous sodium chloride waterbot was put on a chloroform bath before pushed by a permanent magnet at a velocity of ~1.4 mm/s. The scale bar shown in the video was 1 mm.

Supporting Video 2 – Reciprocating actuation: At same platform, attractive and repulsive motions of the paramagnetic and diamagnetic droplets were shown. In this case, the petri dish was strategically placed on the magnet in such a manner that when the paramagnetic (diamagnetic) waterbot was placed 1.5 cm (0 cm) away from the magnet it was attracted (repelled) towards (by) the magnet.

Supporting Video 3 – Miniaturized waterbot: Motion of a 40 µm paramagnetic waterbot inside the 10x optical microscope under the influence of external magnetic guidance.

Supporting Video 4 – Drug loaded waterbot: Motion of a paracetamol loaded waterbot under remote magnetic guidance.

Supporting Video 5 – Fluorescing waterbot: Motion of a paracetamol loaded waterbot tagged with a fluorescent probe under remote magnetic guidance.

Supporting Video 6 – Drug transport and delivery through oilbot: A 7 ml of water was filled in a 90 mm petri dish before a 10 µl oilbot composed of water-oleic acid emulsion was gently dispensed on the water bath. The video shows the migration of the oilbot under the influence of the external magnetic guidance before the release of the water phase into the water bath after ~16 s due to the breaking of the water in oil emulsion.

Supporting Video 7 – Waterbot dialing: The video shows that a paramagnetic aqueous $FeCl_3$ waterbot could be moved on a solid slippery surface with the help of a remote guidance to dial a telephone number decorated on the surface.

Supporting Video 8 – Waterbot Packman: The video shows that aqueous $FeCl_3$ waterbots of magenta and yellow colors could be employed to play the real life Packman game on a solid slippery surface with the help of external magnetic guidance.

Supporting Video 9 – Waterbot splitting and patterning: The video shows the splitting of paramagnetic waterbots into parts with the help of remote magnetic guidance and then patterning them into the shape of line, triangle, pentagon, hexagon and heptagon, on a solid surface coated with a thin layer of oleic acid. The video is displayed at 3x speed than normal.