

Description of additional Supplementary Files

File name: Supplementary Video S1

Description: Experiment of trapping and moving a mineral oil drop at the surface of water. A blue dye is added to the oil to distinguish it from water. At the beginning, all DCAs have similar capillary dipolar charges and the particle is trapped at the center of the capillary tweezers. Then, the charge of some DCAs is increased to displace the drop. The DCAs with increased capillary charges are marked by a red + symbol.

File name: Supplementary Video S2

Description: Experiment of directional transport of a 1 mm floating glass bead inside the ratchet. Adjacent DCAs are in phase opposition and tilted by an angle of 45° from the radial direction. The bead is the black circle, while the gray circles correspond to past positions. Streamlines represent the opposite gradient of the height of the simulated interface computed from the superposition of six dipolar capillary charges. At the beginning, the bead is captured at the local minimum of a DCA. When the magnetic field reverses, the glass bead fall down the interface in the minimum at the edge of the left DCA.

File name: Supplementary Video S3

Description: Simultaneous transport of a single glass bead of 1 mm and a dimer inside the ratchet. The dimer is composed of two glass beads of 1 mm that stick together only by a capillary bridge. A sinusoidal current is injected into the coils of the DCAs. They are tilted from the radial direction by an angle of 45° , and adjacent ones are 180° out of phase and therefore have opposite charges. The frequency of the electric current fixes the transport speed. This experiment sets the frequency to 0.2 Hz.

File name: Supplementary Dataset S4

Description: .stl files used to print the different parts of the DCA. It includes the files for the floater, a single support and the rings of supports used in the article.