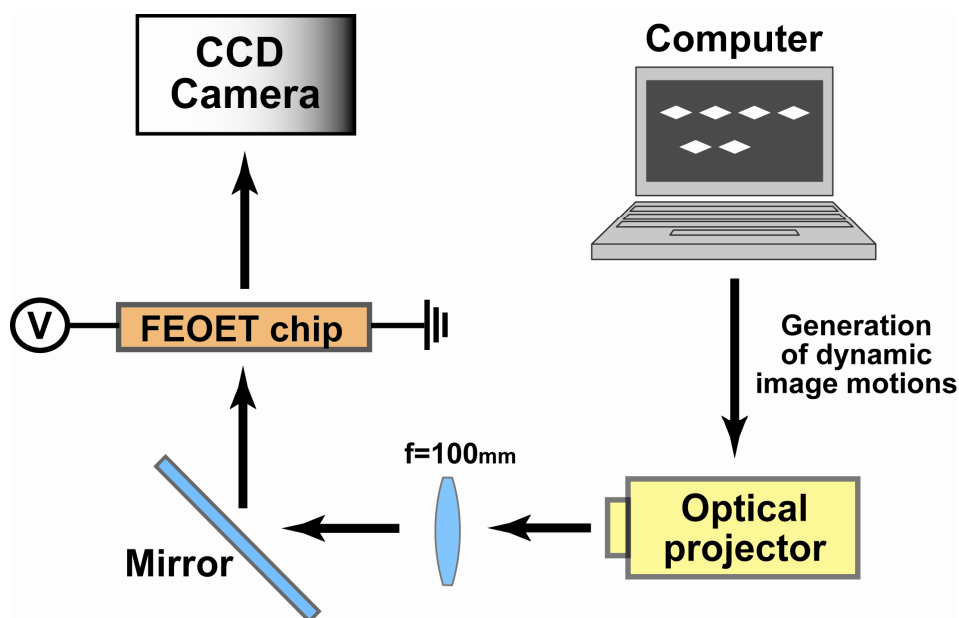


Supplementary information

Supplementary Fig. 1 shows schematic of the experimental setup. The programmable software, Processing, is used to generate the dynamic motions of PD light patterns, which are projected to the bottom side of a FEOET chip through a DMD-based optical projector (BENQ PB6110). The original projection lens is removed and replaced with the optical lens with 100-mm focal length to pattern well-focused images onto a photoconductive a-Si:H layer.

A DC bias is applied through the entire FEOET device and induces a uniform electric field in the lateral direction without the illumination of optical patterns. When the PD light pattern is projected onto the device, the original uniform electric field is broken and the non-uniformity of the field is created for dielectrophoretic (DEP) manipulation. When an aqueous droplet is loaded on the device, electrostatic interaction forces between the electric dipoles induced by the droplet and the light illuminated patterns on the photoconductive surface result in the net motion of the droplet immersed in surrounding oil medium. This droplet movement is recorded to a CCD camera.



Supplementary Fig. 1 Schematic of the experimental setup. The dynamic motion of PD light patterns is projected onto the FEOET chip through a DMD-based optical projector with the optical lens. The droplet movement responses with the motion of optical patterns, resulting from optically-induced DEP force.