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On-demand Droplet Manipulation via Triboelectrification WEI WANG, HAMED VAHABI, MATTHEW CACKOVIC, RUI JIANG, ARUN KOTA, Colorado State University — Controlled manipulation of liquid droplets has attracted tremendous interest across different scientific fields over the past two decades. To date, a variety of external stimuli-mediated methods such as magnetic field, electric field, and light have been developed for manipulating droplets on surfaces. However, these methods usually have drawbacks such as complex fabrication of manipulation platform, low droplet motility, expensive actuation system and lack of precise control. In this work, we demonstrate the controlled manipulation of liquid droplet with both high (e.g., water) and low (e.g., n-hexadecane) dielectric strengths on a smooth, slippery surface via triboelectric effect. Our highly simple, facile and portable methodology enables on-demand, precise manipulation of droplets using solely the electrostatic attraction or repulsion force, which is exerted on the droplet by a simple charged actuator (e.g., Teflon film). We envision that our triboelectric effect enabled droplet manipulation methodology will open a new avenue for droplet based lab-on-a-chip systems, energy harvesting devices and biomedical applications.

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