

# Supporting Information

## Controllable Flowing of Dielectric Fluid Droplet under the Action of Corona Discharge

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### SUPPORTING INFORMATION

*Movie S1* - Polymerization of dielectric liquid (MP4).

*Movie S2* - Migration of the dielectric fluid (MP4).

*Movie S3* - Separation & merger of the polymerized dielectric fluid (MP4).

*Movie S4* - Operating multiple polymerized droplets simultaneously (MP4).

*Movie S1* - Polymerization of dielectric liquid (MP4).

Initially, a layer of liquid silica gel film is deposited on the patterned substrate with a microliter syringe. And then, power on the high voltage DC power and adjust the voltage to above 6.0 kV, and four combined strategies of the switches are implemented, which are turning on one, two, three and four switches, respectively. Under the four strategies, The details of polymerization of liquid are displayed in the movie S1. It is worthy to mention that turning on means that the ITO plate electrode is connected to the negative terminal of the high voltage DC power.

*Movie S2* - Migration of the dielectric fluid (MP4).

Firstly, coat a layer of liquid silica gel film to the patterned substrate with a microliter syringe, and turn on switch 1 and turn off the others. And then, when a dielectric droplet is formed on conductive area 1, turn off switch 1 and turn on switch 2 at the same. The droplet moves from conductive area 1 to conductive area 2, completing the control of droplet downward movement. Similarly, the droplet can be controlled to move to the left, to the upside, to the right. In addition, the droplet also can be controlled to move to the diagonal.

*Movie S3* - Separation & merger of the polymerized dielectric fluid (MP4).

We initially put a drop of 30 microliters of silicone on the patterned substrate, and then turn on the switch 1 that enables the droplet doing not freely diffuse and form a single polymer droplet on area 1. Then, we turn off this switch and turn on the two adjacent switches (switch 2 and 4). It can be found that the droplet will disperse from the conductive region 1, and move to the conductive region 2 and 4, completing the motion control of a single droplet divided into two small droplets. Then turn off switch 2 and 4, and turn on switch 1 at the same time, the two formed droplets will be merged into a single droplet again in the original separation position.

*Movie S4* - Operating multiple polymerized droplets simultaneously (MP4).

When multiple polymerized droplets are manipulated at the same time, the droplets will move to the target position. After two droplets are polymerized on the conductive region 4 and 1, turn off switch 4 and 1, and turn on switch 3 and 2. Then these two polymerized droplets will directly move to the current conductive region 3 and 2, respectively. While if two droplets are polymerized on diagonal regions, change all the switches' states, both the polymerized droplets on region 1 and region 3 will be separated to the current conductive region 2 and region 4.