Electronic Supplementary Material (ESI) for Lab on a Chip.

In-Air Particle Generation by On-Chip Electrohydrodynamics

(Supplementary Material)

Three spraying modes are observed under different ranges of applied voltage on the nozzle, which are typically called as dripping mode, single jet mode and multiple jet mode. In the single-jet mode, the applied voltage is strong enough to establish a stable electrospray with the visible Taylor cone. As applied voltage continues to increase, the stronger electric field causes the spray to disperse unstably. Once the voltage reaches a specific value, the spray enters multiple jet mode in which the spray breaks into multiple and stable jets, the number of jets increases with the applied voltage.

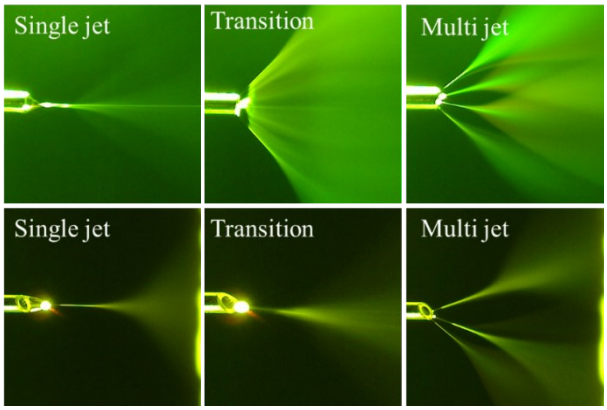

Figure S1. Spray mode of flat-tip and chamfered tip nozzles

The required voltage to overcome dripping mode does not significantly depend on the flow rates. Notably, the stable single jet mode can be established within a wide range of voltage for the chamfered nozzle. There are two reasons for this phenomenon; firstly, the chamfered nozzle allows the single jet to create an angle against the horizontal line before completely transforming into multiple jet mode, secondly, the chamfered nozzle encourage corona discharge that turns excessive charge into ionic wind and stabilises the spray process.

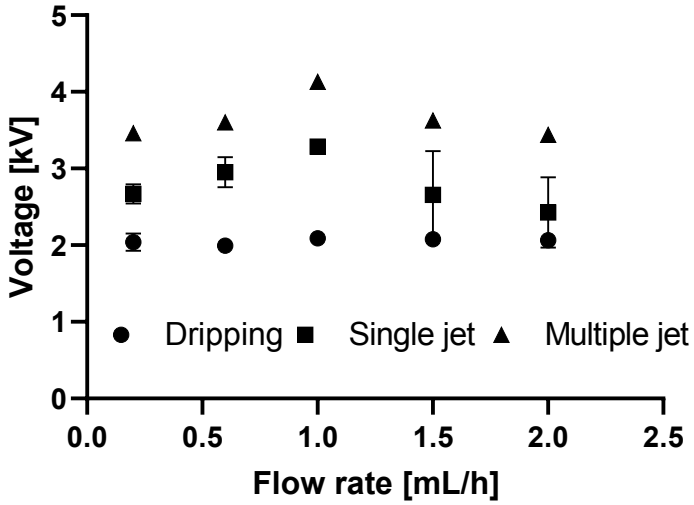

Figure S2. Voltage thresholds for spray mode at different flow rates

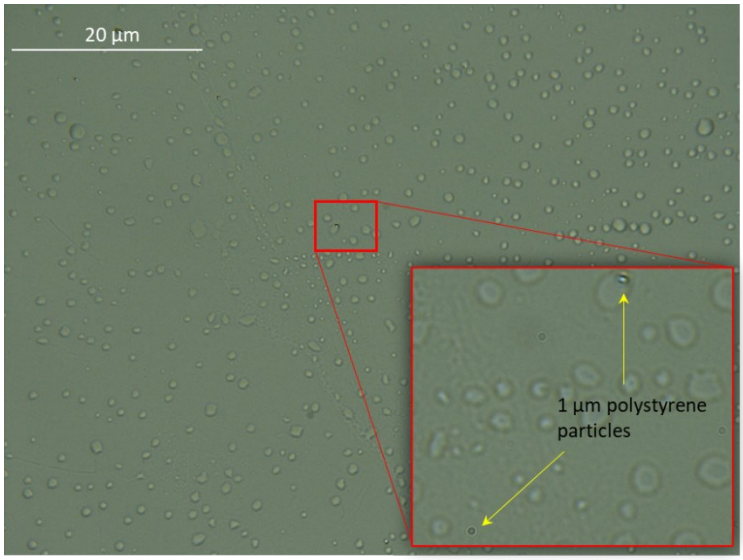

Figure S3. Deposition of sprayed droplets/particles on the glass substrate