

Abstract Submitted
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Digital microfluidics by using Electric Charging of Droplet¹

YONG-MI JUNG, IN SEOK KANG, POSTECH — We evaluate the novel actuation of droplets by exploiting Coulombic forces acting on conductive droplets immersed in a dielectric fluid. The droplet under a DC voltage can be charged by direct contact, by charge transfer along an electrical conducting path, or by both mechanisms. A droplet is deformed to a shape with a sharper tip near electrode. The droplet acquires charges through it and may then be transported rapidly by exploiting Coulombic forces. For actuation by this phenomenon, we construct a platform for handling droplets on the device by using electrode dots arrayed on substrate. A programmable voltage supply is connected through an electrical switch to the electrodes. In the experimental results, droplets are actuated along the electric field signal. The droplet never adhere surface of chip when it moves. We also perform electrocoalescence and chemical reaction in a merged droplet as an essential step for being used as droplet-based microreactors. When two droplets approach each other due to Coulombic force, a liquid bridge is formed between them. The chemical reaction simultaneously occurs by coalescence of droplets.

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