

Actuation of a droplet on a microfluidic system using the electrophoresis of a charged droplet

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Electrophoresis of a charged droplet (ECD) has been suggested as a novel method to manipulate a microdroplet. This work is about the development of a microfluidic chip using ECD method. We have made 4X5 pin array. Each pin is connected to a control circuit which can manage the polarity of the electrode. The control circuit is made of relay and managed by LabView program in a computer. The pin array itself cannot be used for droplet actuation because it cannot hold the fluid medium. So, we have tried to make a flat and hydrophobic surface with minimal electrode exposure surface for stable droplet movement. After number of trials, we have found two candidate materials for the surface: paraffin and poly-dimethylsiloxane (PDMS). Rotational and translational motions of a microdroplet have been performed on this microfluidic system. We have demonstrated the control of a water droplet by an electric circuit and have shown the feasibility of a microfluidic chip based on the ECD method.