

Electronic Supplementary Materials

Video 1

Title: Formation of a virtual microchannel using pressure driven flow.

Video Legend: The formation of a virtual microfluidic conduit over a voltage activated insulated electrode in an oil ambient. The aqueous electrolyte solution (red) is pumped in through the inlet over a voltage-activated electrode at a constant rate of 10 $\mu\text{L}/\text{min}$. It conforms to the shape of the electrically biased electrode forming a 3 cm long, 500 μm wide fluid conduit.

Keywords: Electrowetting, Pressure driven flow, Microfluidics, Programmable.

Video 2

Title: Simulation of a virtual microchannel formation.

Video Legend: A 3D illustration of the simulated model (ESI CFD ACE+) for channel formation using electrowetting on dielectric for confinement and pressure driven flow for fluid introduction. The interface between the aqueous electrolyte (pink) and the oil (blue) indicates the shape of the fluid conduit between two parallel plates with only the bottom plate electrowetting.

Keywords: Simulation of Electrowetting, Flow modeling, Microfluidics, Pressure driven flow, Electrowetting.

Video 3

Title: Reconfiguration of virtual microchannels.

Video Legend: Programmable reconfiguration of virtual microfluidic network between two inlets (left) and two outlets (right). Path between inlets and outlets are defined by biasing appropriate electrodes. Paths are activated and deactivated while maintaining flow. In essence the device behaves as a microfluidic multiplexer.

Keyword: Programmable microfluidics, Reconfigurable channels, Microfluidics, Electrowetting channels, microfluidic multiplexing.