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Abstract

Electrowetting (EW) has found a wide range of the potential applications including fast response displays, lab-on-a-chip microfluidic devices, and light vales. However, fundamental understanding of dynamics of EW-actuated droplet is not clear. In this work, a combined numerical approach was employed to study the EW response of a droplet subject to direct current (DC) actuating signals. Computational fluid models were developed by using the moving mesh method. A molecular kinetic theory based dynamic contact angle (DCA)model was implemented as the boundary condition at the three phase contact line, which considers the effects of the pinning force, the contact line friction and the electrical force. It was found that the computational fluid dynamics models were able to accurately predict dynamics of EW-induced droplet.

Figures used in the abstract

Figure 1: Schematic of EWOD system