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Manipulation of compound drops by electric fields MARRIVADA REDDY, ASGHAR ESMAEELI, Southern Illinois University at Carbondale — Manipulation of tiny amounts of fluids in the form of drops is the central task in many lab-on-chips (LOB) applications. However, in certain applications such as blood analysis, there is a possibility of contamination of the discrete samples (drops) since they may leave their marks on the walls as they are pushed through the network of channels. One way to get around with this problem is to encapsulate the fluid sample by a neutral fluid. This necessitates a fundamental understanding of the behavior of the compound drops. While drops and particles can be manipulated by different forces, a particularly attractive method is the application of electric field as electricity is readily available and can influence the flow from a distance. Here, we propose to examine manipulation of compound drops suspended in another fluid by a uniform electric field. We use Direct Numerical Simulations (DNS) in conjunction with a one-field formulation to solve the governing Navier-Stokes and electrohydrodynamic equations. The goal is to understand the role of the controlling parameters, such as material properties and the strength of the electric field, on the deformation and orientation of the drops and the induced flow.

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