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Electrothermal Flow in Microfluidic Reservoirs XIANGCHUN XUAN, Department of Mechanical Engineering, Clemson University, Clemson, SC 29634-0921, JUNJIE ZHU, SRIRAM SRIDHARAN, Department of Mechanical Engineering, Clemson University, Clemson, SC 29634-0921, USA, GUOQING HU, LNM, Institute of Mechanics, Chinese Academy of Sciences, Beijing 100190, China
— Electrokinetic flow is an efficient technique for manipulating liquids and samples in microfluidic devices. However, there exists inevitable Joule heating in electrokinetic flow due to the liquid's resistance to the electrical current. As such, both temperature rises and gradients are caused in the liquid, which has long been known to affect the electrokinetic fluid and sample transport within the fluid conduit such as a micro capillary or a microchannel. So far, however, no work has been done on Joule heating effects in microfluidic reservoirs that are the origins of all fluid and sample motions. In this talk we present an experimental and numerical study of electrokinetic fluid flow in microfluidic reservoirs. We demonstrate that fluid circulations can be induced by electrothermal effects inside the reservoir, which is potentially useful for trapping biomolecules or enhancing sample mixing.

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