

Electrode Engineering for On-Chip Liquid Driving by Using Electrokinetic Effect

Authors : Reza Hadjiaghaie Vafaie, Aysan Madanpasandi, Behrooz Zare Desari, Seyedmohammad Mousavi

Abstract : High lamination in microchannel is one of the main challenges in on-chip components like micro total analyzer systems and lab-on-a-chips. Electro-osmotic force is highly effective in chip-scale. This research proposes a microfluidic-based micropump for low ionic strength solutions. Narrow microchannels are designed to generate an efficient electroosmotic flow near the walls. Microelectrodes are embedded in the lateral sides and actuated by low electric potential to generate pumping effect inside the channel. Based on the simulation study, the fluid velocity increases by increasing the electric potential amplitude. We achieve a net flow velocity of 100 $\mu\text{m/s}$, by applying $\pm 2\text{ V}$ to the electrode structures. Our proposed low voltage design is of interest in conventional lab-on-a-chip applications.

Keywords : integration, electrokinetic, on-chip, fluid pumping, microfluidic

Conference Title : ICECEBE 2017 : International Conference on Electrical, Computer, Electronics and Biomedical Engineering

Conference Location : Paris, France

Conference Dates : September 21-22, 2017