

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

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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 ± 2 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

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