

Abstract Submitted
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Application of electrokinetic instability to control fluid mixing inside micro-channels¹ ZHEYAN JIN, HUI HU, Iowa State University — An experimental investigation is conducted to utilize electrokinetic instability to control/enhance fluid mixing inside Y-shaped micro-channels. Microscopic particle image velocimetry and microscopic laser induced fluorescence techniques are used to conduct qualitative flow visualization and quantitative velocity and concentration field measurements to examine the enhanced mixing process inside the micro-channels. Different designs of the Y-shaped micro-channels, which including adding microstructures such as steps or cavities inside the mixing channels, will be investigated and compared quantitatively. The objectives of the study is to understand the fundamental nature of electrokinetic instability, to study the effects of the relevant parameters such as the magnitude and frequency of the applied electric fields on the effectiveness of the mixing control/enhancement, and to explore/optimize design paradigms for the development of robust electrokinetic micromixers for various microfluidics or “lab-on-a-chip” applications.

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