Design and Analysis of Micromixer for Enhancing Its Mixing Performance

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Abstract

Mixing is an important process in a microfluidic system such as micro total analysis systems. In this paper, design and analysis of various micro-mixers for enhancing the mixing performance is presented. At first, the basic principles of mixing along with the mixing length and mixing time calculations are discussed. In general, macro-scale mixing is achieved with turbulence while mixing in micro-scale relies mainly on diffusion. This is due to the laminar behavior of the flow in micro channels with characteristics low Reynolds number. An exhaustive study of different configurations of micro-mixers and their effect on mixing performance is presented here. Micro-mixer with obstacles located at the centre of the channel with different configurations is used to enhance mixing in the channel, so as to reduce the mixing length. Micro Y channels with different shapes of chambers and obstacles such as rectangle, square and rhombus are analyzed by comparing it with plain Y channel. Simulation results were obtained by COMSOL Multiphysics® software.