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Mixing efficiency inside micro-droplets coalesced by two components in cross-structure¹ YANLIN REN, ZHAOMIAO LIU, YAN PANG, Beijing Univ of Technology — The mixing of micro-droplets is used in analytical chemistry, medicine production and material synthesis owing to its advantages including the encapsulation and narrow time residence distribution. In this work, droplets are coalesced by two dispersed phase with different flow rates, generated in cross-structure and mixed in planar serpentine structure. The mixing efficiency of micro-droplets under control characters including the width of entrance and the flow rate of dispersed phases have been investigated by experiments and numerical simulations. The UDS (user-defined scalar) as dimensionless concentration of the solution is adopted in simulation, and is used to calculate the concentration and the mixing effect. By changing the flow rates and the entrances' width, the changing rules of the mixing characters have been obtained. The asymmetry distributions of components make rapid mixing process in half part of each droplet when travel through a straight channel. Increasing of the ratio of entrance width result into larger droplet and weaken the chaotic mixing effect. Meanwhile, the coalesced mechanism can be performed by ranging the ratio of flow rates, the ranges are also determined by the widths of entrances.

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