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Droplets coalescence at microchannel intersection chambers with different shapes[1] ZHAOMIAO LIU, XIANG WANG, RENTUO CAO, YAN PANG, College of Mechanical Engineering and Applied Electronics, Beijing University of Technology, China — The influence of microchannel intersection chamber shape on droplets coalescence process is investigated in this study. Three kinds of chamber shapes (half-round, triangle and camber) are designed to realize head-on droplets coalescence. The coalescence processes are visualized with high-speed camera system and the internal flow patterns are resolved with micro-PIV system. Experimental analyses on droplets coalescence position, coalescence time and the critical conditions are discussed. Both direct coalescence and late coalescence can be observed in the camber junction while only the late coalescence is present for the half-round and the triangle junction. The critical capillary number Ca* varies for different working systems or intersection shapes. Ca* in the camber junction is larger than that in the other two junctions for each working system and it decreases with the increase of the viscosity ratios for each intersection shape. Moreover, the characteristics of the velocity fields for different coalescence cases are analyzed for in-depth understanding of the process.

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