

Abstract Submitted
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Experimental investigation of non-Newtonian/Newtonian liquid-liquid flow in microchannel EYNAGELIA-PANAGIOTA ROUMPEA, WEHELIYE WEHELIYE, MAXIME CHINAUD, PANAGIOTA ANGELI, Department of Chemical Engineering, University College London, Torrington Place, London, WC1E 7JE, LYES KAHOUADJI COLLABORATION¹, OMAR. K. MATAR COLLABORATION² — Plug flow of an organic phase and an aqueous non-Newtonian solution was investigated experimentally in a quartz microchannel with I.D. 200 μm . The aqueous phase was a glycerol solution where 1000 and 2000 ppm of xanthan gum was added while the organic phase was silicon oil with 155 and 5 cSt viscosity. The two phases were brought together in a T-junction and their flowrates varied from 0.3 to 6 ml/hr. High speed imaging was used to study the characteristics of the plugs and the effect of the liquid properties on the flow patterns while a two-colour micro-PIV technique was used to investigate velocity profiles and circulation patterns within the plugs. The experimental results revealed that plug length was affected by both flowrate and viscosity. In all cases investigated, a film of the continuous phase always surrounded the plugs and its thickness was compared with existing literature models. Circulation patterns inside plugs were obtained by subtracting the plug velocity and found to be depended on the plug length and the amount of xanthan gum in the aqueous phase. Finally, the dimensionless circulation time was calculated and plotted as a function of the plug length.

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