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Influence of Marangoni flows on extraction and reaction performance RADHAKRISHNA T G, ANIL VIR, JASON PICARDO, PUSHPAVANAM SUBRAMANIAM, Indian Institute of Technology Madras — In this work, the effect of Marangoni flows on mass transfer is investigated for stratified flow of two immiscible liquids in a microchannel. Experiments involving reactive extraction of carboxylic acids from organic phase using aqueous sodium hydroxide are performed. Often in analysis, the liquid-liquid interface is assumed to be flat. However, a deforming interface was observed for certain flow rate ratios. The conditions under which the interface deforms are determined. The experiments are complemented with mathematical modeling and simulation. Navier-Stokes equation and transport equation are simplified using the lubrication approximation and an approximate solution is obtained. The interphase mass transfer and hydrodynamics are coupled through the shear stress boundary condition. In cases where the interface is flat, the transport equation is solved numerically using finite difference method. In cases where the interface deforms, the evolution of interface is captured using kinematic boundary condition and the transport equation is solved numerically.

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