

Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Experimental and numerical investigations of ionic liquid-aqueous flow in microchannel QI LI, DIMITRIOS TSAOULIDIS, PANAGIOTA ANGELI, Department of Chemical Engineering, University College London, Torrington Place, London, WC1E 7JE — The hydrodynamic characteristics of plug flow of an ionic liquid-aqueous two-phase system in a microchannel were studied experimentally and numerically. A mixture of 0.2M N-octyl(plenyl)-N,N-diisobutylcarbamoylmethylphosphine oxide (CMOP)- 1.2 M Tri-n-butylphosphate (TBP) in room temperature ionic liquid 1-butyl-3-methylimidazolium bis[(trifluoromethyl)sulfonyl]amide ($[\text{C}_4\text{min}][\text{NTf}_2]$), and a nitric acid solution of 1M were chosen. These fluids are relevant Eu(III) separation by extraction from nitric acid solutions. The two liquid phases were introduced into microchannels of 0.2 and 0.5mm internal diameter through a T-junction inlet. The flow pattern was visualized during plug formation at the inlet section and further downstream by means by bright field planar micro-Particle Image Velocimetry. Key features of plug flow, such as plug velocity, film thickness, plug length and recirculation intensity were measured under various experimental conditions. To gain further understanding of the 3-D flow field, Computation Fluid Dynamics (CFD) simulations approach were also conducted.

Qi Li

Department of Chemical Engineering, University College London, Torrington Place, London, WC1E 7JE

Date submitted: 31 Jul 2015

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