



Contribution ID: 985

Type: **Oral Presentation**

Stability and functionality of immobilised liquid-liquid interfaces in periodic structured media

Monday, 22 May 2023 16:15 (30 minutes)

In this talk, I will discuss how liquid-liquid interfaces can be stably locked into periodic structured porous substrates and used for controlling the transfer of momentum, heat and mass with an external flow. First, we address the behavior of liquid-liquid interfaces locked in textured surfaces and exposed to an external shear flow. When the liquid-liquid interface remains stable, these surfaces can enhance heat and mass exchange with a bulk flow and reduce flow drag and biofouling. We demonstrate how shear stresses and soluble surfactants modify the dynamics of the liquid-liquid interface, resulting in waves, drainage and Marangoni stresses, all of which significantly affect transport processes with the external flow. Second, we introduce systems with liquid-liquid interfaces locked in three-dimensional periodic porous scaffolds. By tuning the wettability and introducing appropriate “fluid traps”, we can immobilize interfaces of different morphologies, including spherical droplets or diamond-shaped structures. These multi-phase materials are remarkably stable and provide a very high area-to-volume ratio. We will discuss their potential as flow-continuous heterogeneous catalysis and for other applications that require optimizing mass transfer across interfaces, such as CO₂ capture.

Participation

In-Person

References

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Track Classification: (MS24) Invited and Plenary Sessions