

Microfluidic tools to study stability of protein-stabilised emulsions and foams

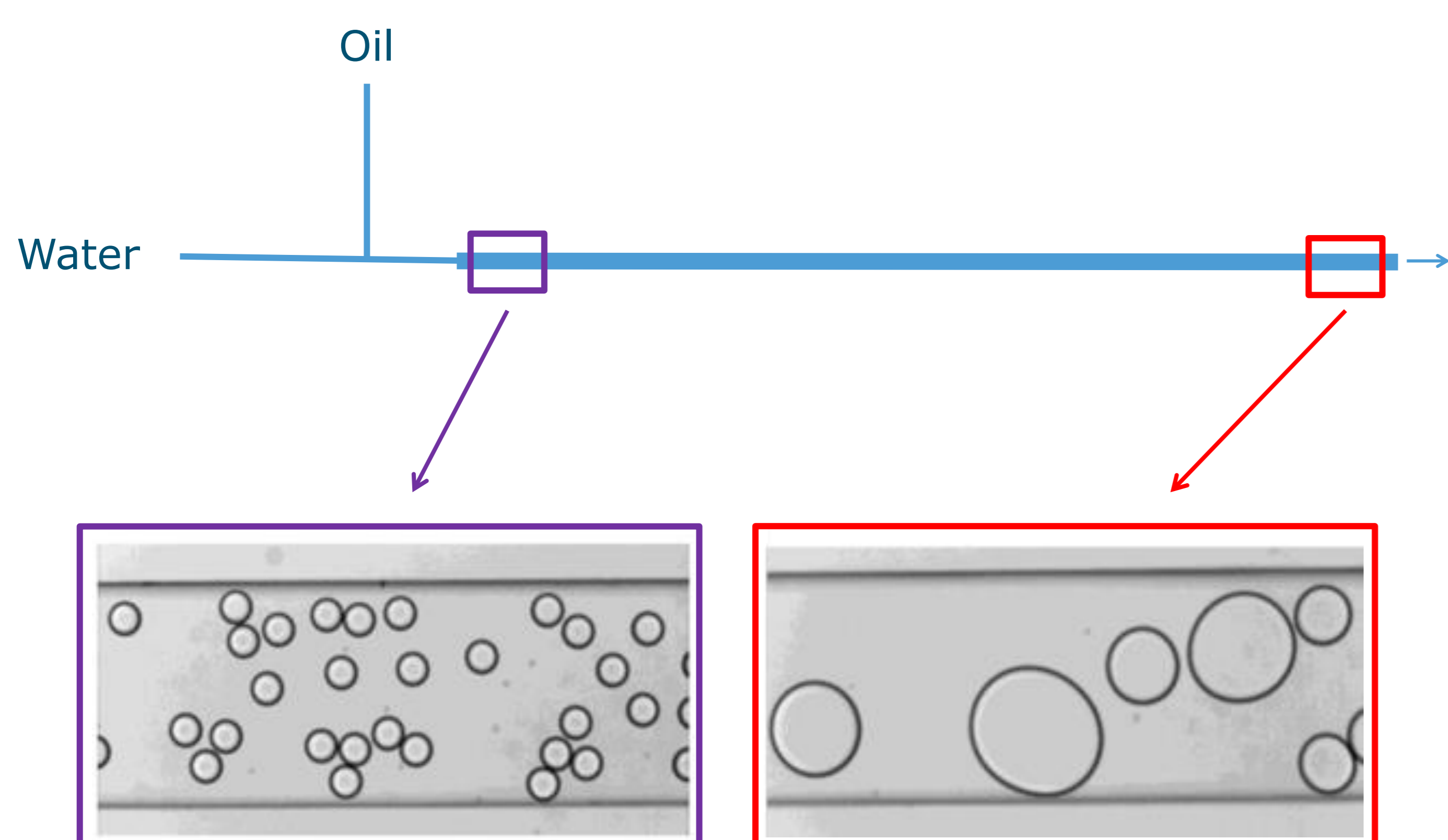
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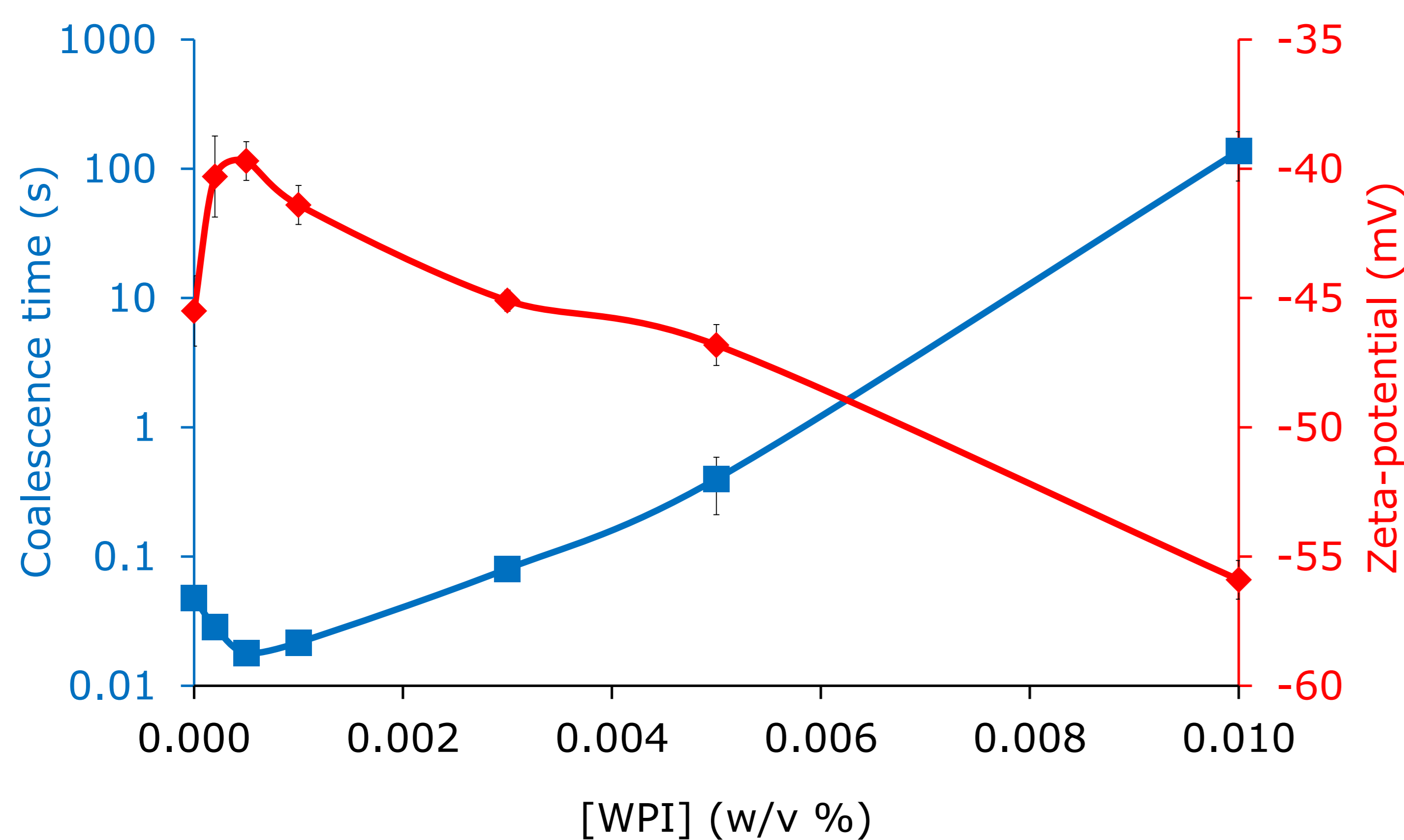
Microfluidic tools like the micro-channel and micro-centrifuge have been used before to study the stability of surfactant-stabilised emulsions.[1,2] The current work shows that the methods are also suitable for protein-stabilised emulsions and foams that are intrinsically more complex in behaviour than the relatively simple systems investigated previously. This opens up a new field of application of microfluidics in food technology.

Emulsions studied with the micro-channel

Micro-channel: Oil droplets are produced at the T-junction (width = 100 μm), droplets collide and possibly coalesce in the larger channel (width = 500 μm , length = 3 cm), the rectangles indicates the regions from which images were recorded.



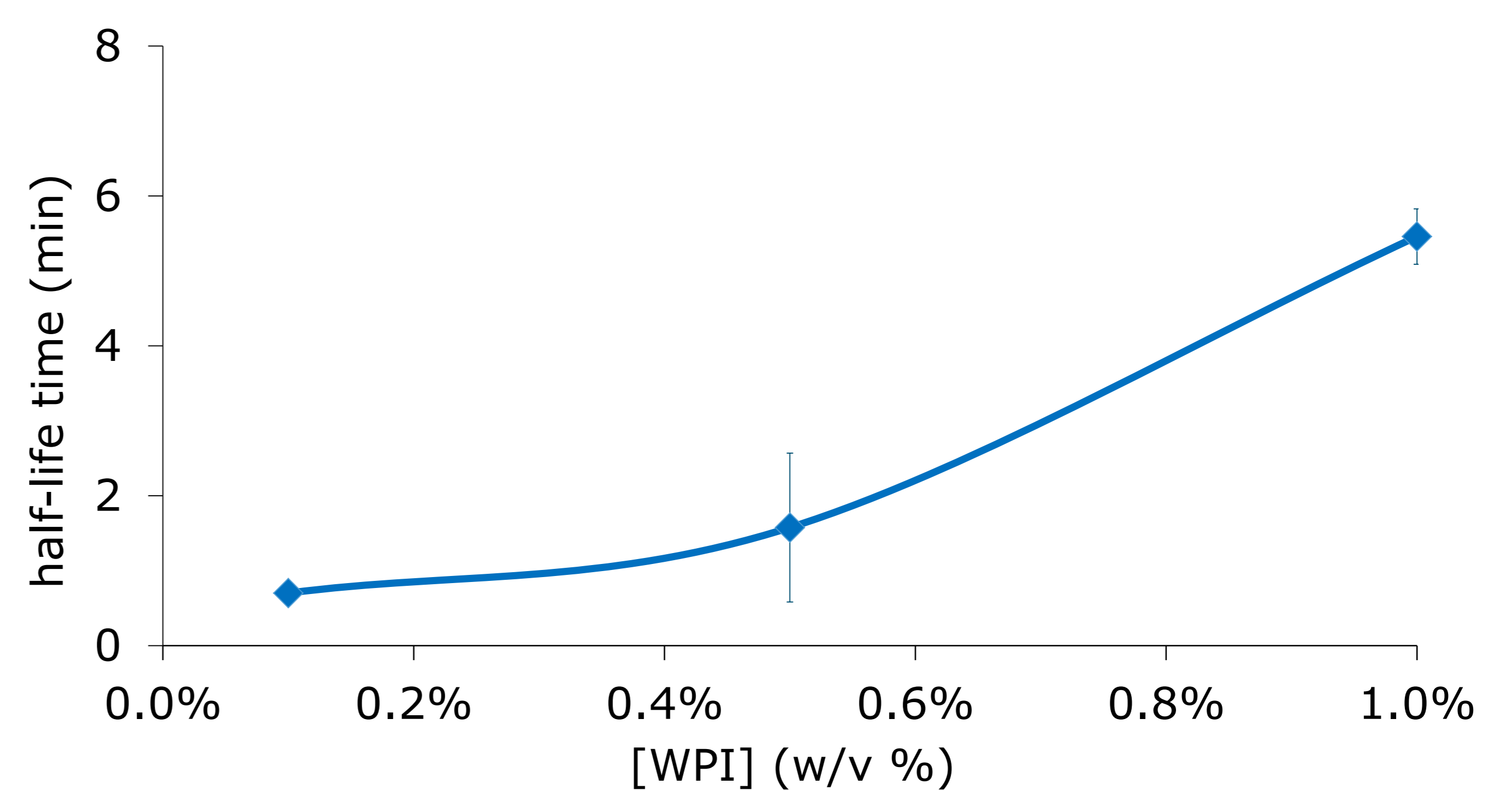
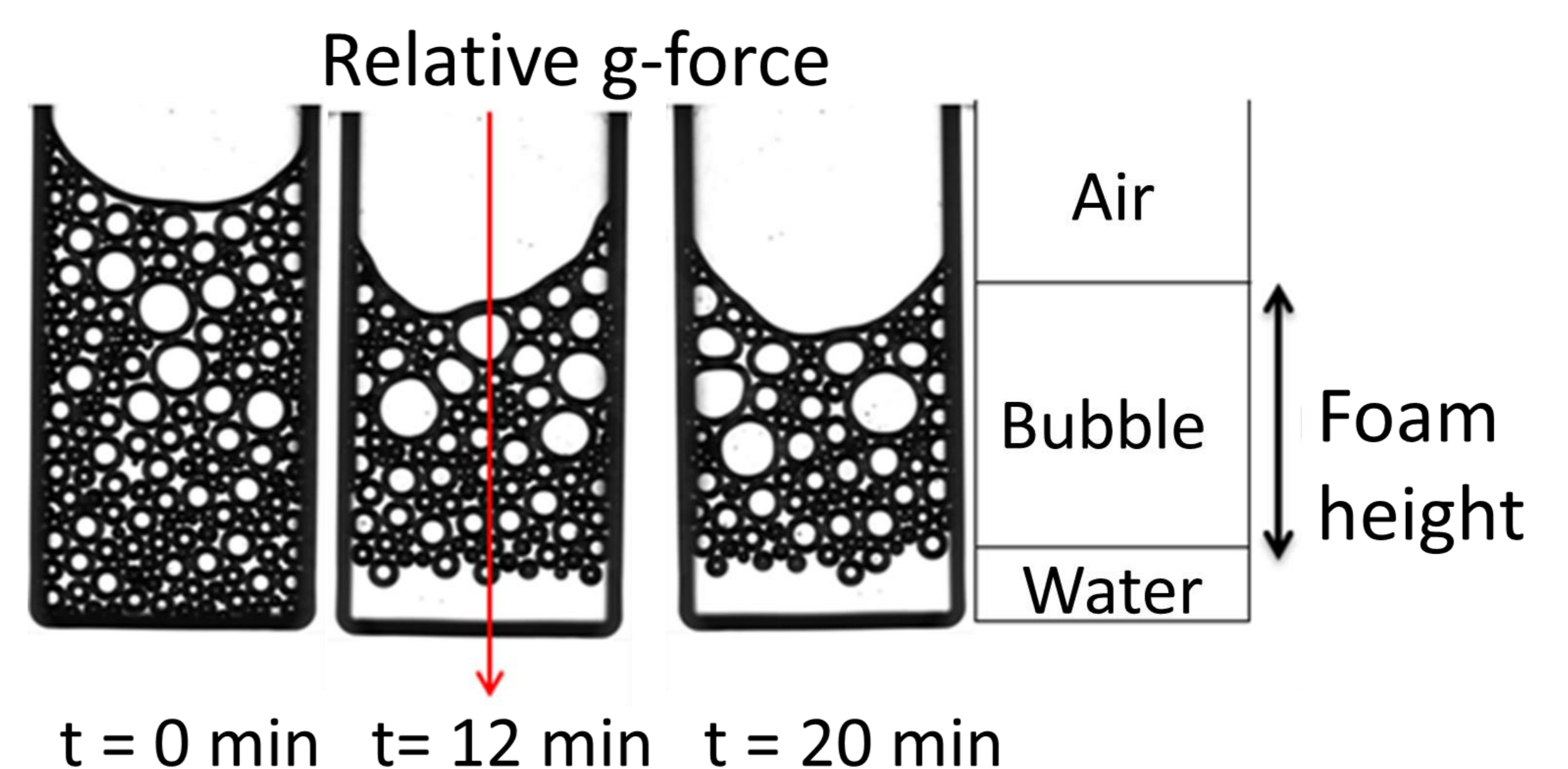
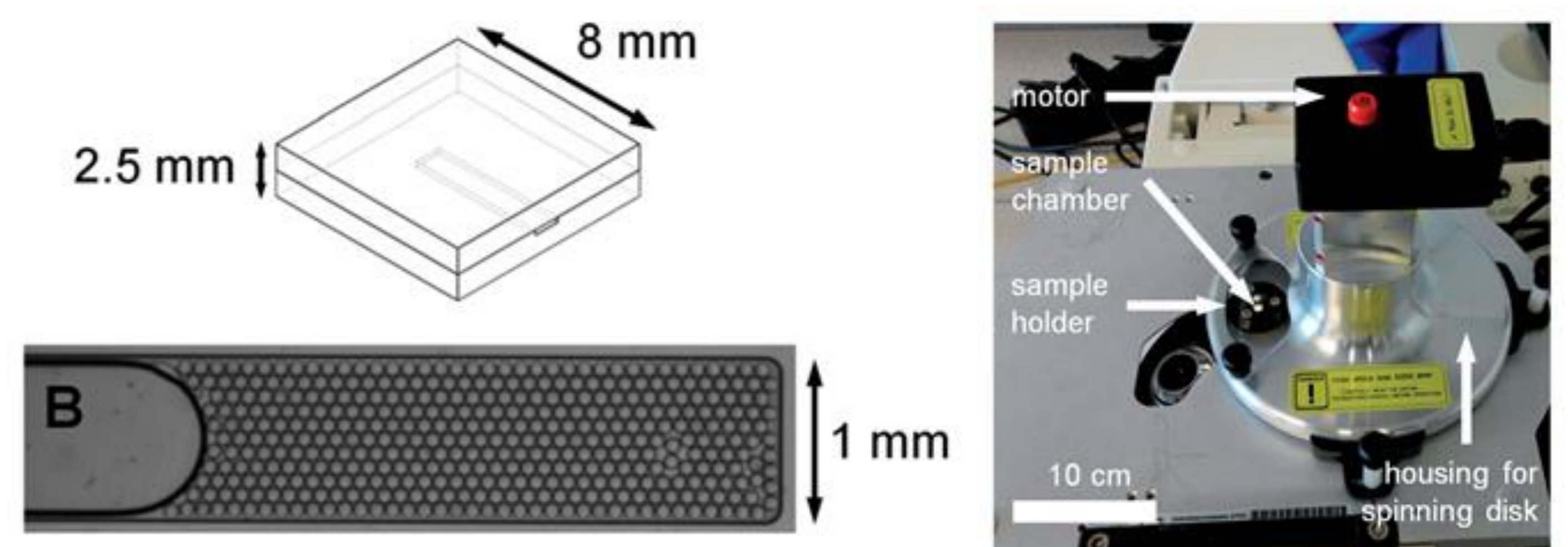
Images of 0.005 w/v % WPI at the entrance and outlet of the coalescence channel



The stability of oil droplets with low % WPI was lower than without any proteins. A possible explanation could be an insufficient double layer thickness resulting in an increased attractive interaction.

Foams studied with the micro-centrifuge

Micro-centrifuge: a dead end chamber is filled with sample and placed in a centrifuge mounted on a microscope, triggered pictures are made of the chamber during centrifugation.



Stability of WPI foams is concentration dependent as expected.

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References

1. T. Krebs, K. Schroën, and R. Boom, *Soft Matter*, **2012**, *8*, 10650-10657.
2. T. Krebs, D. Ershov, C.G.P.H. Schroen, and R.M. Boom, *Soft Matter*, **2013**, *9*, 4026-4035.