

Abstract Submitted
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Droplet dynamics in oil-in-water emulsions in enhanced gravity and temperature BIJOY BERA, KARIN SCHROEN, Wageningen University and Research — Oil-in-water emulsions occur frequently in our daily life and in many cases the emulsion is subjected to extreme conditions such as high shear or enhanced gravity. Although this system has been used for decades, understanding of the fundamental behavior of such emulsions in extreme conditions remains limited. Krebs et al. (2013) is a rare example where drop dynamics in enhanced gravity was studied in detail. However, drop dynamics at combined enhanced gravity and elevated temperature conditions remains unexplored even though it is essential for many systems in practice. We have built and used a novel microfluidic setup where the emulsion can be subjected simultaneously to higher gravity (using centrifugal force) and higher temperatures. We vary the droplet size of the dispersed phase, the amount and type of emulsifier in addition to gravity and temperature. The results clearly indicate the influence of thermal fluctuations in the thin water film upon the coalescence and compression patterns. We have concomitantly developed a model taking into consideration the various factors affecting the drainage of the aqueous film between droplets of the dispersed phase. Our experimental results are validated against the results obtained from this analytical model.

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