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Bubble Formation and Stability: Dynamic Adsorption Effects in an EDGE Microfluidic Device[1] JOLET DE RUITER, BOXIN DENG, KARIN SCHRON, Wageningen University — EDGE microfluidic devices exploit a sudden expansion in channel depth – and thus drop in Laplace pressure – to drive formation of bubbles (or droplets). This geometry allows for the production of monodisperse, small bubbles over a wide range of air pressures, and independent of continuous phase shear. Here, we use arrays of extremely shallow rectangular pores (1 micrometer height) to study the formation of small bubbles (approx. 20 micrometer) and their stabilization with whey proteins commonly used in food foams. Protein adsorption to the air-water interface plays a crucial role in the bubble dynamics, giving rise to two distinct regimes of bubble creation that differ in frequency and size of bubbles formed at the pore, and the extent of coalescence. We calculate the pressure gradients driving the flows to provide further insights into the two regimes of bubble formation.

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