Towards green flotation: Investigating the effect of rhamnolipid biosurfactant on single bubble adhesion dynamics

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Streszczenie

In this study we performed an experimental analysis of the influence of rhamnolipid (RL) biosurfactant produced by Pseudomonas aeruginosa on the dynamics of bubble adhesion onto model surfaces of various hydrophobicity. The attachment time of a single bubble to a solid surface with contact angles of 6, 34, 49 and 80◦ was evaluated at different concentrations of RL in the range of 0 to 500 mg·dm− 3 , both at pH 5 (non-ionic form) and pH 10 (anionic form). The dependence of the three-phase contact (TPC) formation time on biosurfactant concentration was determined by monitoring the bubble-solid surface interactions using a high-speed camera. It was found that as the concentration of RL rises, the formation time of the TPC extends as a result of an increase in the film drainage time. A significant effect of RL on the process of TPC expansion (lower rate) and the size of the contact area between the bubble and the surface (smaller surface area) was also noted. This study provides a better understanding of the effect of one of the most popular biosurfactants on the fundamental act of the flotation process: attachment of the particle to the bubble.

Słowa kluczowe

Green flotation, Three-phase contact, Frother, Glycolipid biosurfactant, Rhamnolipids