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Amphiphilic copolymers for fouling-release coatings

Albert CAMÓS NOGUER¹, Stefan M. OLSEN², Søren HVILSTED¹, Søren KIIL^{1,*}

¹Department of Chemical and Biochemical Engineering, Technical University of Denmark (DTU), Kgs. Lyngby, Denmark

²Department of Fouling Release Systems, Hempel A/S, Kgs. Lyngby, Denmark
*sk@kt.dtu.dk

Polydimethylsiloxane (PDMS) resins are extensively used as binder in fouling-release coatings due to the low critical surface energy and low elastic modulus of PDMS. These properties result in poor adhesion of the fouling organisms, which are therefore detached by hydrodynamic forces during navigation [1,2,3]. Other compounds are usually mixed together with the binder (e.g. silica and pigments) in order to improve the mechanical, thixotropic and visual properties of the coatings. It has been shown, however, that these ingredients have a negative effect on the fouling-release properties of the coatings [1,2,4].

Together with the PDMS-system, non-reactive polymers have been used to improve the fouling-release properties of the coatings. Initially, hydrophobic siloxane-based polymers were used, which aimed to increase the hydrophobicity of the PDMS surface [5,6]. However, copolymers comprising hydrophilic, amphiphilic and zwitterionic chemistries have been recently introduced due to their resistance to protein adsorption [7,8]. As a result, most of the current commercial fouling-release coatings contain either amphiphilic or hydrophilic copolymers to improve the fouling release properties of the coatings [9,10,11].

This work shows the effect of an amphiphilic copolymer that induces hydrophilicity on the surface of the silicone-based fouling release coatings. The behaviour of these copolymers within the coating upon immersion and the interaction of these surface-active additives with other compounds of the coatings are addressed.

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