Superspreading: Aqueous Trisiloxane Solutions on Hydrophobic Substrates

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Abstract

Spreading behaviour of aqueous solutions of trisiloxane T6 and T8 over highly hydrophobic smooth solid substrates is experimentally investigated. The kinetics of spreading of both trisiloxane solutions shows a similar behaviour. At concentrations below critical aggregation concentration (CAC) the kinetics of spreading is described by the theory presented by Starov, Kosvintsev, Velarde. J. Colloid and Interface Sci., (2000). 227, 185. According to that theory the surfactant molecules adsorb in front of the moving three phase contact line. The latter process results in a partial hydrophilisation of an initial hydrophobic substrates and a spreading as a consequence. However, at higher concentrations both in between CAC and CWC (critical wetting concentration) and above CWC the spreading process proceeds in two stages: the first fast stage that rate is more than ten time faster then the rate of the next much slower second stage. It is shown that the second stage develops according to the previously described model. The presence of the first stage probably is a characteristic feature of "superspreaders". The smallness of the characteristic time scale of the first stage shows that the physical phenomenon behind it is very much different from the surfactant molecules transfer according to the above model. The authors would like to acknowledge the support from Engineering and Physical Sciences Research Council, UK (Grant EP/D077869/1).