Adsorption behavior for particle adsorption on the oil/water interface: the role of the interfacial tension

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Young's law, which states that there is an equilibrium of liquid wetting angles on a solid substrate to the surface energies of the materials, enable particles to be adsorbed at the fluid-fluid interface irreversibly. Despite the strong driving force towards equilibrium, many studies have reported that the solid particles cannot reach the interface for the low interfacial tension. The rate for particles reaching the equilibrium position is also important to reach the position, but little is known about the adsorption dynamics. Here we show that the adsorption of nanocellulose to an oil/water interface is characterized along with the interfacial tensions by a hydrodynamics approach in terms of the DLVO theory and the drainage model. While the attractive colloidal forces for all cases, the drainage times for the nanocellulose adsorption are varied with the interfacial tensions linking the Pickering emulsion system. Our study provides useful physical insights to elucidate particle adsorption systems at the oil/water interface for low interfacial tensions.