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## Effects of Titanium Dioxide Nanoparticles on the Wet Foams Produced by Ionic Surfactants: A Study on Air-Liquid Interfacial Properties

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The presence of  $\text{TiO}_2$  nanoparticles in aqueous surfactant solutions affect the air-liquid interfacial characteristics of the system in which they have been dispersed. Foam formation, as a process in the development of new materials, is one of the phenomena influenced by these interfacial properties. In this paper, we studied the behaviour of  $\text{TiO}_2$  nanoparticles in two ionic surfactant solutions, CTAB and SDS, separately. While the concentration of nanoparticles was fixed at 0.1 wt %, the surfactant concentrations were varying from  $1\text{e-}6$  M to  $1\text{e-}1$  M. Using surface tension measurement of the solutions with different surfactant concentrations in the absence and presence of  $\text{TiO}_2$  nanoparticles, the adsorption of particles at the air-liquid interfaces and their synergistic actions with surfactants were achieved. Moreover, the foamability and foaming features, as liquid volume fraction and bubble size distribution, of the dispersions were also tested. The results showed that the  $\text{TiO}_2$  nanoparticles decreased the surface tension of the aqueous CTAB solutions while the surface tension of SDS solutions increased by the presence of the same particles. Therefore, it is probable that nanoparticles are able to be adsorbed at air-liquid interface in case of CTAB solutions, but does not happen in case of SDS. The foam formation for  $\text{TiO}_2$ -CTA solutions was at the concentration of  $5\text{e-}4$  M while it was  $1\text{e-}3$  M for  $\text{TiO}_2$ -SDS dispersions. The size of bubbles of the CTAB foams were smaller than that of SDS in presence of nanoparticles. The adsorption of  $\text{TiO}_2$  particles at the air-liquid interface of the solutions with CTAB prevents the coalescence. This research elucidates the likely mechanism of foaming and  $\text{TiO}_2$ -surfactant interactions and provides a reference for industrial applications of foam-related systems.

**Keywords:**  $\text{TiO}_2$  Nanoparticles, Surface Tension, Surfactants, Foamability

### Biography:

Farzaneh Hajirasouliha is a postgraduate researcher working on the interactions of nanoparticles at air-liquid interfaces. My areas of interest include surfactants, foamability, wettability, adsorption isotherms, and particles interactions at biosystems.