Interfacial properties and AFM studies of soot nanoparticles in foams and emulsions stability

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During combustion processes a complex mixture of nanosized carbon-based products are released, both gaseous and condensable, due to the incomplete combustion of fuel. Environmental and toxicological impact have risen great interest toward the physico-chemical behaviour of these particles and in particular the behaviour of the particles influenced by the interactions with common pollutants, such as surfactants.

In this work commercial carbon black and carbon soot particles have been used as model systems in comparison with real combustion-formed particulate. At water/air and water/oil interfaces carbonaceous particles alone are not surface active, while, in the presence of surfactants, they transfer to the fluid interfaces resulting in a change of their interfacial behaviour. Particles-surfactant interactions play a significant role on emulsion and foam stability, providing water-in-hexane stable emulsions, with a less evident effect on the foam stability.

AFM studies allow the morphological properties of the different particles to be investigated as well as particles-substrate interactions evidencing a possible correlation between size, shape and interfacial behaviour.