# DO STRONG SURFACTANT/SWCNT-COOH INTERACTIONS ASSURE GOOD DISPERSION QUALITY?

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## Abstract

Carbon nanotubes, CNT, are building blocks used in the construction of molecular assemblies. Due to their mechanical, optical and electronic properties, they can be used in diverse fields. For instance, CNT have been used as sensor or as vectors in gene transfection.[1] The separation (dispersion) of the carbon tubules, that is their solubilization, can be improved by chemical methods. One of these consists on the use of surfactants. Several studies about the interactions between surfactants and carbon nanotubes have been carried out.[2] However, the mechanism of such interaction is not clear yet. In order to shed light on the surfactant/carbon nanotube interactions, quantitative information about the interactions (or adsorption) of cationic and anionic surfactants with functionalized carbon nanotubes (SWCNT-COOH) were obtained. The surfactants investigated were hexadecyltrimethylammonium bromide –CTAB-, dodecyltrimethylammonium bromide -DoTAB-, octyltrimethylammonium bromide –OTAB- and sodium dodecysulphate –SDS. Electromotive forces of solutions containing surfactant and SWCNT-COOH were measured by using selective electrodes of the different surfactants previously prepared by us. Results showed a sigmoidal dependence of the free surfactant concentration on the nanotube concentration (see Figure 1). This behaviour demonstrates the cooperative character in the surfactant/nanotube binding. Interaction (adsorption) of anionic and cationic surfactants with functionalized single-walled carbon nanotubes (SWCNT-COOH) are driven by hydrophobic interactions between the hydrocarbon tails and the nanotube walls. Electrostatic interactions practically exert no influence. Driving forces in the dispersion processes seem to be different.

## References

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[2] (a) Y. Chen, R.N. Gunasinghe, X.-Q. Wang and Y. Pang, RSC Advances 3 (2013) 25097. (b) B. Sohrabi, N. Poorgholami-Bejarpasi and N. Nayeri, J. Phys. Chem. B 118 (2014) 3094.

## Figures

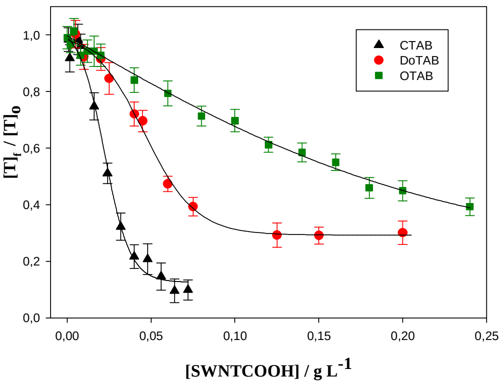

Figure 1

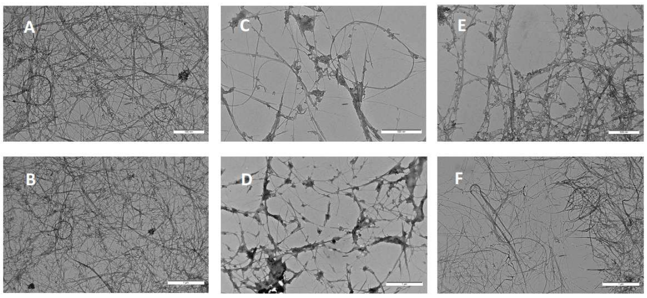

Figure 2