Nano-composites of DNA-wrapped Carbon Nanotubes and TiO₂ or SiO₂.

Martina Romio^{*}, Camillo La Mesa

Dept. Chemistry, Sapienza University of Rome, Rome, Italy.

*martina.romio@icloud.com

Carbon nanotubes, CNTs, are effectively stabilized by wrapping single strand DNA, ss-DNA, on their surface. The resulting adducts are kinetically and thermodynamically stable. [1] Such entities build up nano-hybrids with SiO₂ or TiO₂ nano-particles, NPs, in presence of surfactant. The conditions leading to a significant adsorption onto such adducts were investigated in some detail. These include optimizing the concentration of the adducts, of NPs, and of the cationic surfactant (CTAB), used as an adjuvant.[2,3] Depending on the working conditions, it is possible getting homogeneously organized hybrids, mostly in case of TiO₂. Characterization by DLS, electro-phoretic mobility, SEM and AFM clarified some details of the surfactant-assisted association between ss-DNA/CNT and SiO₂, or TiO₂. Their clustering on the adducts ends in the formation of hybrids, and is controlled by electrostatic interactions among two such components. Surface coverage of adducts by TiO₂ is significant and homogeneous. In case of SiO₂ the results are erratic, because of the persisting negative charge on such CTAB-covered particles. These hybrids are useful for possible application in heterogeneous catalysis.



Figure 1 TiO₂ clustering onto DNA-wrapped CNTs. The red bar indicates a 300 nm size.

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