Concentration measurements of nanotubes in solution

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Surfactant-enhanced dispersion of carbon nanotubes (CNT) involves sonication and centrifugation. It results in CNT–rich supernatant and precipitate phases containing non-dispersed CNT with a small amount of the surfactant. The concentration of dispersed CNT in the supernatant is essential for further applications. This work presents a simple procedure for the determination of the dispersed CNT via a direct quantitative measurement of the precipitate phase. Removal of surfactant from the precipitate is obtained by its filtration and washing. The residual remaining surfactant is determined by thermo gravimetric analysis (TGA). The CNT weight in the precipitate is obtained at reasonable accuracy. The concentration of the dispersed CNT in the supernatant is then calculated by mass balance. The method has been successfully applied for both single- and multi wall carbon nanotubes (MWCNT and SWCNT) with a variety of surfactants such as Triton TX100 (non ionic surfactant), sodiumdodecylbenzene sulphonate (SDBS - anionic surfactant), Bovine Serum Albumin (BSA - protein) and with pluronic F127 (nonionic polymeric surfactant).