# Combined Strategy for the Dispersion/Dissolution of Single Walled Carbon Nanotubes and Cellulose in Water

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## Supporting Information:

## Materials:

Single walled carbon nanotubes (SWNTs) obtained from Sigma which was produced by arc method (purity-50-70%, Tubes occur in bundles of length ~20 μm, 1.2-1.5 nm × 2-5 μm , bundle dimensions).

Avicel-PH101 purchased from Fluka and cellulose (Sigmacell type-50) from Sigma. The bagasse cellulose were prepared by treating sugarcane bagasse first with alkali (20%) and then with sodium chlorite (4%).

## Methods:

The SWNTs were used without any modification. 1 mg SWNTs and 5 to 10mg of cellulose (sigmacell, avicel, bagasse cellulose and cotton) were added in 15ml tube containing 5 ml of deionised water of pH around between 6.0 and 10 by adding very little amount of NaOH. The above mixture were sonicated (Sonics, Vibra-cell) at 80% amplitude (output-around 8-10 watts, 145 μm) using 3 mm probe for 5 to 10 min. Then the undissolved cellulose or nondispersed nanotubes were separated by centrifugation at 10,000 rpm for 10 min. Dispersion of nanotubes were also checked for all range of pH of water

## Characterization:

Raman and FTIR spectroscopy:

The dispersed nanotubes were separated by using 0.2μ filter and dried in the form of film or powder. The Raman spectra of this dried sample or liquid SWNT dispersed sample and cellulose (sigmacell) were recorded using Horiba JY LabRaman HR 800 Micro Raman Spectrometer. The excitation wavelength used was 632nm. For FTIR spectra the above dried sample were mixed with KBr. The pallets were prepared and spectra are recorded using A Perkin Elmer Spectrum 1 FTIR. The spectra's of sigma cellulose and sigma SWNTs were used as control.

HR-TEM:

A drop of dispersed SWNTs was casted on a carbon-coated copper grid. The images were obtained using a FEI Technai F30 electron microscope operating at 300 kV

Cellulose analysis:

Cellulose attached to the nanotubes was measured using cellulases. The known amount of dried cellulose –nanotube mixture (previously dispersed and filtered) was redispersed in a water. The pH of water were adjusted at 5 and cellulase enzyme preparation ( adsul et al 2007) from EU1 mutant of *P. janthinellum* was added. The mixture was kept at $50^0$C for 5 hrs. The reducing sugars released were analyzed by dinitrosalicylic acid method (Fischer and Stein, 1967). The glucose was also measured by glucose oxidase method.

References:

1. Adsul, M.G.; Bastawde , K.B.; Varma , A.J.; Gokhale, D.V. *Bioresour. Technol.* **2007**,98, 1467–1473.
2. Fischer, E.A.; Stein, E.A. *Biochem. Preparations,* **1961,** 8, 27–33.

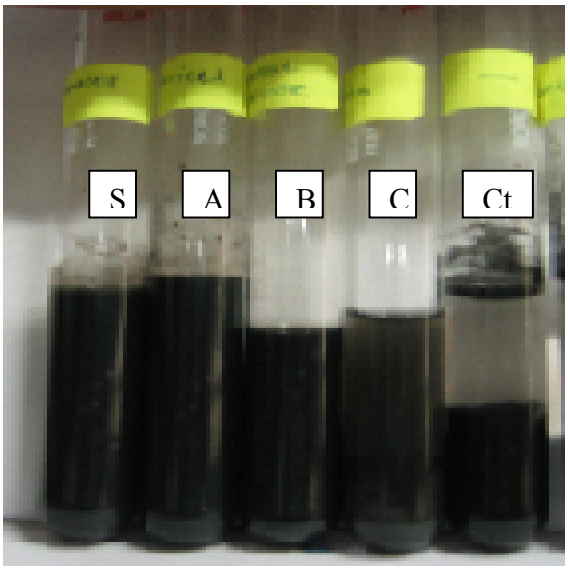


**Figure 1**. Dispersion of SWNTs with cellulose (S-sigmacell, A-Avicel, B-Bagasse cellulose, C-cotton, Ct-control)