Fate of Carbon Nanomaterials in Natural Waters and Water Treatment Processes

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Professor Jae-Hong Kim and Professor Joseph Hughes at Georgia Institute of Technology reported in 2007 that multiwalled carbon nanotubes (MWCNT) form a stable suspension in water due to adsorption of natural organic matter (NOM), which is present ubiquitously in natural water bodies (Hyung et al. 2007). Professor Kim's subsequent study (Hyung and Kim 2008) suggested that the adsorption of NOM to carbon nanotubes strongly depends on the type of NOM as well as water quality parameters such as ionic strength and pH. These findings are significant, as they suggest that the dispersal of carbon-based nanomaterials in the natural aqueous environment might occur to an unexpected extent following a mechanism that has not been previously considered in environmental fate and transport studies. Figure shows the TEM images of MWCNT stabilized in the aqueous phase by Suwannee River NOM. Professor Kim's group further reported that C_{60} clusters dispersed in water in presence of NOM were relatively well removed by conventional water treatment processes, the first line of defense against human consumption.

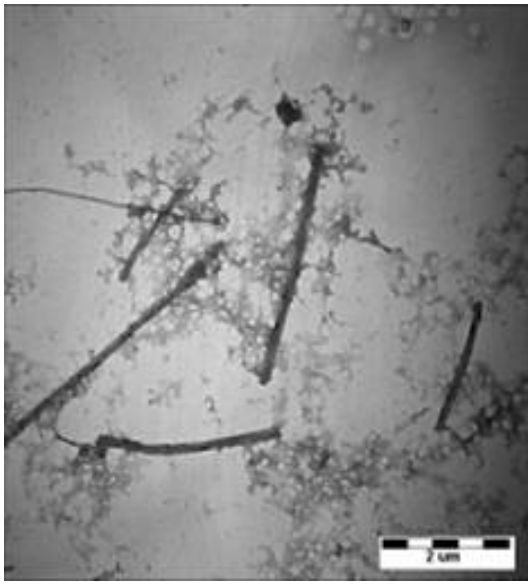

Figure 4.x. MWCNT stabilized in the aqueous phase by Suwannee River NOM.

References/Publications

Hyung, H.; Fortner, J. D.; Hughes, J. B.; Kim, J. H. (2007) "Natural Organic Matter Stabilizes Carbon Nanotubes in the Aqueous Phase." *Environmental Science & Technology*, 41, 179-184

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Hyung, H; Kim, J.H. (2009). "Dispersion of C_{60} in Natural Water and Removal by Conventional Drinking Water Treatment Processes." *Water Research* (in review).