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Title: Effects of Surface Oxides and Natural Organic Matter on the Transport of Carbon Nanotubes in Aquatic Environments

Abstract (200 words):

The focus of this work is on the aggregation and transport of multi-walled carbon nanotubes that have had oxygen containing functional groups grafted into their surface (O-MWCNTs), as can occur through deliberate treatment (usually for the specific purpose of dispersion in polar liquids) or through environmental processes. Through column studies in well-defined silica media and using O-MWCNTs of varying oxygen extent, we explored the role of surface oxide functional groups on deposition and transport over a range of pH, ionic strength, and cation type and in waters containing varying concentrations of Suwahnee River natural organic matter

Electrolyte and pH effects on O-MWCNT aggregation and deposition followed general tenets of DLVO theory, although Ca^{++} effects (unlike those of Na^+) did not vary markedly among O-MWCNT materials. Low concentration of NOM (0.2 to 5 mgC/L) was found to effectively stabilize O-MWCNTs under all conditions studied, even at high ionic strength, albeit with somewhat less effectiveness in the presence of Ca^{++} . Overall, our studies confirm that filtration theory is an appropriate model for evaluating CNT fate while also providing new information about collision efficiencies as a function of conditions. Information of this type is critically needed to reduce uncertainties in exposure risk models.

Short Bio:

William (Bill) Ball is a Professor of environmental engineering in the Department of Geography and Environmental Engineering at Johns Hopkins University (JHU). He has over 25 years of experience in the investigation of processes controlling water quality and contaminant fate, as relating to both engineered processes of water treatment and transport of contaminants in natural aquatic systems. He is the Associate Director of the JHU Center for Water and Health and JHU Global Water Program <<http://globalwater.jhu.edu/>>, is a member of JHU's Institute for Nanobiotechnology (INBT) <<http://inbt.jhu.edu/>>, and currently serves as Faculty Advisor for the JHU student chapter of Engineers Without Borders-USA. Professor Ball's research interests are primarily on physical and chemical processes affecting water quality in the contexts of water supply, drinking water treatment, sanitation, and environmental water quality.