

Carbon-Based Nanomaterials in the Environment

Supporting/Contributing Agency/Institution: EPA, NSF, and Indiana Water Resources Research Center

An assessment of the potential environmental impacts of fullerene (C₆₀) and single-wall carbon nanotubes (SWNTs) on soil microbial processes, prior to environmental release, is underway in the laboratories of Drs. Turco and Nies at Purdue University. This work focuses on an assessment of the potential for environmental stress using soil as the test system. Our observations show that C₆₀, introduced in dry form or as aqueous suspension, has a limited impact on the structure and activity of the soil microbial community. Moreover, the soil microorganisms were not affected by C₆₀ introduced in organic solvent (toluene or tetrahydrofuran) or as different-sized clusters. Introduced SWNTs showed some minor effects on microbial community structures but it is not clear if the effect is from the carbon materials or the metal catalyst resident in the SWNT. Our results suggest that the soil organic matter may be a major factor affecting the bioavailability of the nanomaterials. Future research is needed concerning the interaction of organic matter and carbon nanomaterials in natural environment.

References/Publications

- Tong, Z. H.; Bischoff, M.; Nies, L.; Applegate, B.; Turco, R. F. Impact of fullerene (C₆₀) on a soil microbial community. *Environ. Sci. Technol.* 2007, 41, 2985-2991.
- Tong, Zhonghua. 2008. Response of soil microorganisms to the introduction of nanoscale carbon materials. Doctor of Philosophy Thesis, Purdue University, December.