

Public Abstract

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Title:AQUATIC TOXICITY OF ONE DIMENSIONAL CARBON NANOMATERIALS

This study determined the toxicity of one dimensional carbon nanomaterials to amphipods, midge, oligochaetes and mussels as representative test organisms which are typically used in toxicity testing of contaminants in water and sediment. Tests were conducted with as-produced and modified carbon nanotubes (CNT) from commercial sources, and with as-produced silicon carbide nanowires (SiCNW). There were three primary studies (1) toxicity to aquatic invertebrates of SiCNW in water or sediment exposures, (2) toxicity to aquatic invertebrates of CNT in water exposures, and (3) toxicity to aquatic invertebrates of multi-walled CNT (MWCNT) in sediment exposures. In the SiCNW study, exposures to sonicated and non-sonicated SiCNW were conducted with amphipods and to sonicate SiCNW were conducted with midge, oligochaetes and juvenile mussels. Also 10-d tests were conducted with amphipods exposed to sonicated SiCNW in sediment. The CNT tests were conducted for 14-d in water with amphipods, midge, oligochaetes, and mussels. Also 14- and 28-d whole-sediment toxicity tests with CNTs were conducted with amphipods.

Overall, the toxicity of the CNTs or SiCNW appears to be the effect of the coating of respiratory surfaces or the blocking of the digestive tract of the exposed benthic invertebrates. The CNTs appear to smother the organisms and may interfere with their ability to feed. The metals dissolution from the as-produced CNTs could also have contributed to the toxicity.