

AQUATIC TOXICITY OF ONE DIMENSIONAL
CARBON NANOMATERIALS

Joseph Nganga Mwangi

Dr. Baolin Deng, Dissertation Supervisor

ABSTRACT

This study determined the toxicity of one dimensional carbon nanomaterials (CNMs) to amphipods, midge, oligochaetes and juvenile mussels in water and sediment. As-produced or modified carbon nanotubes (CNTs) and silicon carbide nanowires (SiCNW) were selected to represent CNMs. Sediment tests were conducted for 10-d with SiCNW and for 14- and 28-d with CNTs using amphipods.

Sonicated SiCNW in water were toxic to the amphipods but not to the midge, oligochaetes or mussels and non-sonicated SiCNW in water were not toxic to amphipods. Sonicated or non-sonicated CNT in water were toxic to all four benthic invertebrates. CNTs spiked into sediments were mildly toxic to amphipods reduced in toxicity. During exposures, the test organisms were coated with the CNMs and the organisms also ingested and accumulated these CNMs in their guts. Overall, the toxicity of the CNMs (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 metals dissolution from the as-produced CNTs could also have contributed to the toxicity.