Journal of Sensors
Volume 2009 (2009), Article ID 131628, 6 pages
doi:10.1155/2009/131628

Research Article

The Adsorption Properties of *Bacillus atrophaeus* Spores on Single-Wall Carbon Nanotubes

P. Cortes,[1] S. Deng,[2] and G. B. Smith[3]

[1]Department of Mechanical & Aerospace Engineering , New Mexico State University, Las Cruces, NM 88003, USA

[2]Department of Chemical Engineering , New Mexico State University, Las Cruces, NM 88003, USA

[3]Department of Biology, New Mexico State University, Las Cruces, NM 88003, USA

Received 21 September 2008; Accepted 19 March 2009

Academic Editor: Wojtek Wlodarski

Abstract

An adsorption equilibrium and a kinetic study of *Bacillus atrophaeus* on Single-Wall Carbon Nanotubes (SWCNTs) were here performed to provide the basis for developing biosensor devices for detecting threatening micro-organisms in water supply systems. *B. atrophaeus* spores and carbon nanotubes were subjected to a batch adsorption process to document their equilibria and kinetics. Here, commercial nanotubes were either studied as received or were acid-purified before adsorption experiments. The *Bacillus* spores appear to show higher affinity towards the purified nanotubes than to the as-received nanomaterial. The effective diffusivity of the spores onto the purified nanotubes was found to be approximately 30 percent higher than onto the as-received nanotubes. It seems that the removal of amorphous carbon from the as-received nanotubes through a purification process yielded an intimate nantoubes-spore interaction as revealed by transmission electron microscopy. Freundlich model successfully correlated the adsorption equilibrium data for the nanotubes-spore interaction. Transmission electron micrographs showed extensive contact between the *Bacillus* and the purified nanotubes, but the association appeared less intimate between the spores and the as-received nanotubes.