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Antifungal properties of surface functionalized electrospun polyacrylonitrile nanofibers

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The rapidly developing nanomaterials-processing technique of electrospinning provides a unique and straightforward way to prepare continuous fibers at nanometer scale. As an exciting new nanomaterial, polymer nanofiber mats from electrospinning possess extraordinary properties such as small diameter and concomitant large specific surface area as well as unique capability to serve as a nano-scale carrier of active agent and other biomedical applications. Polymer nanofibrous membranes from electrospinning have been evaluated at the interface of nanomaterial and biology in the area of bio-adsorption and others. Although interest on electrospun nanofibers continues to grow exponentially; yetdetailed interaction between microorganism cells and electrospun nanofibers is still largely unknown. In this study Amidoxime surface functionalized polyacrylonitrile (ASFPAN) nanofibers were prepared by electrospinning polyacrylonitrile (PAN) solution followed by surface treatment in hydroxylamine aqueous solution. The interaction between ASFPAN nanofibrous membrane and fungus (*yeast, Saccharomyces cerevisiae*) was investigated for the first time and viability of yeast cells on the nanofibrous membrane was evaluated by biological assays and cells morphology. PAN cast film from the same spinning solution as well as consequent ASFPAN film were employed as control samples. The biological assay revealed that the yeast cells died on the ASFPAN nanofibrous membranes after 30 min of contact while they were still alive on both of control film surfaces. The observations indicated that differentiated cell adhesion on ASFPAN nanofibrous membrane might be the reason for the death of yeast cells. This research partly addressed concerns about the impact of nanoscale fibers on microorganism and the finding is also valuable for antifungal materials.

Biography

Nafisa Sirelkhatim is a PhD candidate at the joint School on Nanoscience and Nanoengineering in Greensboro, NC. She received her BS in Agricultural Engineering in 1994 from College of Engineering and Architecture-University of Khartoum in Sudan, and her MS in Civil & Environmental Engineering, December 2010 at NC Agricultural and Technical State University, Greensboro, NC. Her current research focus is on the applications of electrospun nanofibers in bioadsorption, bioseparation and their antimicrobial properties..

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