

Summary

Date: 05/29/2020

Subject: Puraward Antimicrobial Fibers

Scope

Technical overview of Puraward.

Puraward Technology

Overview

Puraward is a high efficiency fiber embedded with a proprietary technology to enact antimicrobial filtration. Engineered zeolitic substrates scaffolded on the surface of Puraward fibers provide a controlled release of copper and silver ions onto contacting microbes and particles. These ions synergistically attack airborne bacteria, viruses, and fungi upon contact. Puraward is amenable to single or multiple uses over long durations, making it ideal for use in air purification systems. Importantly, the impregnation procedure for Puraward prevents any leaching or off-gassing from the fibers, and the technology is non-hazardous. Efficacy data on a wide array of bacteria, viruses, and mold species support >99.9% removal of these microbial contaminants by Puraward alone.

Fiber

Silver and copper ions in the zeolite carrier exchange with sodium ions found in moisture from the environment, causing a controlled release of silver and copper. Released ions synergistically exact antimicrobial action. These zeolites are integrated onto fibers to accommodate a myriad of end-use applications in air filtration.

The PuraWard Fiber technology (PWF) has been successfully applied to air filters, textiles, and respiratory masks approved by the FDA for their antibacterial and antiviral properties in surgical environments.

Methods of Microbial Removal

Organism	Mechanistic Action
Bacteria	<p>Copper and silver ions are synergistically antimicrobial. Copper ions attack proteins/amino acids of bacterial cell membranes, allowing silver ions to more readily penetrate the microorganism.</p> <p>Sterilization – interaction of silver ions with genomic DNA after entering the cytoplasm disrupts replication</p> <p>Suffocation – causes failure of key enzymes associated with cellular respiration</p> <p>Starvation – Interferes with transport of nutrients coming into the cell</p>
Viruses	<p>Puraward fiber surfaces exhibit a slightly lower pH, which deteriorates the three-dimensional structure of viral capsid/ “protein coat”.</p> <p>Copper and silver ions bind viral proteins, creating further loss of function and inactivation</p>

Possible Delivery Mechanisms

Puraward fibers can be manufactured for use in many different products: face masks, air purifiers, air filters, scrubbers, clothing

Other Technical Specifications

Safety

Puraward fibers are non-leaching, do not off-gas, and have no transdermal effects.

Performance

Sample bacteria and virus removal data is provided below

Viruses	Inhibition Rate	Bacteria/Fungi	Killing Rate
H1N1	99.91% / 5 minutes contact	<i>S. aureus</i>	99.95% / 1 hour contact
H7N9	99.98% / 5 minutes contact	<i>E. Coli</i>	99.96% / 1 hour contact
SARS	99.58% / 5 minutes contact	<i>C. albicans</i>	98.90% / 24 hours contact