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Applying Artificial Neural Networks to Total Hand Evaluation of Disposable Diapers

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ABSTRACT
The objective hand measurement and also handle of the materials used for disposable diapers has been looked into, with consideration given the aspects of both dermatitis and comfort. In this work, we tried to predict the handle of disposable diapers by their physical properties using a back-propagation network and a stepwise regression. Handle properties of diapers were measured by universal test equipment and hand values of the fabrics were determined by a group of panelists consisting of some textile experts. The optimum construction of neural network was investigated through the change of layer and neuron number. The results showed that the back-propagation network could predict the hand values of disposable diapers with a meaningful difference. These disposable diapers were used to show that the results of neural network were in good agreement with subjective test results.

Antimicrobial Properties and Release Profile of Ampicillin from Electrospun Poly(ε-caprolactone) Nanofiber Yarns

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ABSTRACT
Poly(ε-caprolactone) (PCL) electrospun fibers containing ampicillin sodium salt have been produced and twisted into nanofiber yarns. The fiber diameters and crystallinity, the *in vitro* antimicrobial properties of the yarns, and the *in vitro* release of ampicillin from yarns containing various ampicillin concentrations are studied. Decreased fiber diameters and reduced diameter variation are observed with the addition of ampicillin salt into the polymer solution. The results from the zone of inhibition test of the yarns against both gram-positive *Staphylococcus aureus* and gram-negative *Klebsiella pneumoniae* indicate that the released ampicillin retains its effectiveness after the production processes, therefore the as-spun yarns are antimicrobial active. A burst release of ampicillin from the yarns has been observed in the first hour, and the release is almost completed in 96 hours. The burst release is believed to be due to the low compatibility of ampicillin with PCL, the accumulation of ampicillin on fiber surface and the small fiber diameters. An empirical release model is developed to describe the release profile. The results indicate that the electrospun nanofibers yarns will have a great potential to be used for biomaterials, such as surgical sutures, to decrease the surgical site infection rate.

Development of Prototype Double Roller Gin with Improved Power Transmission and its Performance Evaluation

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ABSTRACT
Double roller gins are commonly used in India for ginning seed cotton. International Textile Manufacturers Federation's survey 2005 reported that degree of grease and oil contamination in cotton lint is serious in India[1]. Study revealed that the source of this contamination is the gearbox (power transmission system) of double roller gin as it is filled with grease/oil measuring about 20 kg. Prototype double roller gin has been designed and developed with new power transmission system which minimizes the use of oil and grease to a great extent. High Volume Instrument's results on fiber parameters indicated that quality of lint is at par with existing double roller gin with no prospect of oil and grease contamination. Developed machine is useful for cotton breeders, ginners, farmers to ascertain the ginning percentage and purity of seeds could be maintained. This prototype double roller gin could be the basis for design of modified double roller gin of a commercial size.

The Influences of Hydrophilic Finishing of PET Fibers on the Properties of Hydroentangled Nonwoven Fabrics

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ABSTRACT
Common polyester fibers are hydrophobic in nature. Thus it is hard to process the fibers in the hydroentangled nonwoven process and the resultant nonwoven fabric is hydrophobic as well. In this paper, two kinds of polyester fibers treated with different hydrophilic finishing agents and one common polyester fiber were formed into nonwoven fabrics by using hydroentanglement process. The influences of the hydrophilic and friction properties of the PET fibers on the properties of hydroentangled nonwoven fabrics were studied.

Evaluation of Multiple (3-Cycle) Decontamination Processing for Filtering Facepiece Respirators

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ABSTRACT

Disposable N95 filtering facepiece respirators (FFRs) certified by the National Institute for Occupational Safety and Health (NIOSH) are widely used by healthcare workers to reduce exposures to infectious biological aerosols. There is currently major concern among public health officials about a possible shortage of N95 FFRs during an influenza pandemic. Decontamination and reuse of FFRs is a possible strategy for extending FFR supplies in an emergency; however, the NIOSH respirator certification process does not currently include provisions for decontamination and reuse. Recent studies have investigated the laboratory performance (filter aerosol penetration and filter airflow resistance) and physical integrity of FFRs following one-cycle (1X) processing of various decontamination treatments. The studies found that a single application of some methods did not adversely affect laboratory performance. In the event that healthcare facilities experience dramatic shortages of FFR supplies, multiple decontamination processing may become necessary. This study investigates three-cycle (3X) processing of eight different methods: ultraviolet germicidal irradiation, ethylene oxide, hydrogen peroxide gas plasma, hydrogen peroxide vapor, microwave-oven-generated steam, bleach, liquid hydrogen peroxide, and moist heat incubation (pasteurization). A four-hour 3X submersion of FFR in deionized water was performed for comparison (control). Following 3X treatment by each decontamination and control method, FFRs were evaluated for changes in physical appearance, odor, and laboratory performance. Only the hydrogen peroxide gas plasma treatment resulted in mean penetration levels > 5% for four of the six FFR models; FFRs treated by the seven other methods and the control samples had expected levels of filter aerosol penetration (< 5%) and filter airflow resistance. Physical damage varied by treatment method. Further research is still needed before any specific decontamination methods can be recommended.

Feasibility of Electrospun Polydioxanone – Monocyte Chemotactic Protein-1 (MCP-1) Hybrid Scaffolds as Potential Cellular Homing Devices

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ABSTRACT

A novel cellular homing/chemokine delivery system was developed, in which electrospun polydioxanone (PDO) scaffolds infused with Monocyte Chemotactic Protein-1 (MCP-1) were fabricated and examined for their potential to influence macrophage infiltration/adherence and for their potential to provide extended chemokine release. Over the course of 120 hours, MCP-1 released into supernatant peaked at 24 hours and was detectable by enzyme-linked immunosorbent assay (ELISA) when added to PDO solutions prior to electrospinning at 3000 ng/ml. PDO/MCP-1 hybrids were characterized for biological activity using a test tube ELISA procedure assessing macrophage adherence/infiltration of scaffolds. Results demonstrated an increasing dose-responsive trend with increasing MCP-1 concentration. These initial investigations suggest such hybrid materials have significant potential for use in and improvement of *in situ* tissue regeneration applications by acting as cellular homing devices.