

Electrospinning

Overview:

About 50 patents for electrospinning polymer melts and solutions have been filed in the past 60 years. However, there is no known commercial process for electrospinning. The micro-fine fibers produced by electrospinning randomly collect into thin non-woven fiber mats that behave like micro-porous membranes.

The goal of this program is to utilize electrospinning to produce seamless garments by integrating advanced manufacturing with fiber electrospinning. This would introduce multi-functionality (flame, chemical, environmental protection) by blending fibers into electrospun layers in combination with polymer coatings. The concept is premised on electrospinning fibers directly onto 3-D screen forms obtained from 3-D whole body scanning.

Description:

- Military applications for multifunctional fabrics warrant the investigation of novel textile manufacturing technologies, such as electrospinning, which has the capability of lacing together numerous types of polymers and fibers in a direct one step operation to produce ultrathin layers of protection. These fibers are also expected to be excellent substrates for immobilized enzymes and other catalyst systems to break down toxic chemicals. Recent results show that these fiber webs are efficient aerosol filters.
- Electrospinning also has potential for computer aided manufacturing of garments by simply spraying fiber layers onto advanced 3-D forms generated from laser scanning. As the technique matures, there is a broad range of opportunity for commercial applications on apparel — outdoor wear, exercise wear, environmental protection ensembles.

Electrospinning offers an alternative to conventional manufacturing techniques with potential for reduction in manufacturing costs, improved comfort and durability of garments and production timeliness. This breakthrough technology would also have the potential for creating a whole new industry concept in manufacturing and supply. **Composite nanofibers of fire retardant and chemical resistance ceramics with polymer will be fabricated by the e-spinning technique and evaluated for their functions.**



Source: <http://nsc.natick.army.mil/media/fact/ss&t/Electrospinning.htm>