

FILTRATION EFFICIENCY OF THE COMPOSITE MEDIA PREPARED BY MELTBLOWN & ELECTROSPUN NANOFIBERS

Muralidhar Lalagiri

Vinitkumar Singh

Seshadri Ramkumar

**The Institute of Environmental and Human Health, Nonwoven & Advanced Materials Laboratory,
Texas Tech University
Lubbock, Texas**

Abstract

HEPA filters are characterized by high filtration efficiency, which is obtained by producing nonwoven filters via fibrous electrets and composite filter media. The objective of the study was to enhance the filtration properties of a nonwoven media by increasing porosity and surface area of nanofibers. In this study, Electrospun fibers were collected over a meltblown filter medium, which together constitutes to form a nonwoven composite media. The structural design of the composite media plays a significant role in precise arrangement of electrospun fibers for enhancing functionality of the filter. Overall efficacy of filter media is based on filtration efficiency and pressure drop that in turn determines the quality factor of the filter. The morphological structure of electrospun nanofibers showed micro-scale highly porous structure, which showed significant influence over the filtration efficiency and pressure drop. The structural variation of electrospun fibers can be justified by crystalline behavior of polymer and volatile nature of the solvent. Fibrous filtration is fractional thus efficiency depends on particle size. Testing of composite filter in this study for fractional filtration efficiency showed high particle removal efficiency with less airflow resistance.

References

Kitai Kim, Changhwan Lee, Il Won Kim and Jooyong Kim, *Fibers and Polymers*, 10, 1, 60-64 (2009)

Xiao-Hong Qin, Shan-Yuan Wang, *Journal of Applied Polymer Science*, 102, 1285–1290 (2006)

Acknowledgements

Funding and support from these organizations are greatly appreciated: U.S. Department of Defense, Cotton Incorporated (Texas State Support Program), Cotton Foundation (Memphis), Texas Department of Agriculture (FFRGP), The CH Foundation (Lubbock), ICRC-College of Agricultural Sciences & Natural Resources, Texas Tech University, Plains Cotton Growers, Inc. (Lubbock). Special thanks to these supporters: Mr. Roger Haldenby of Plains Cotton Growers, Inc., Dr. Kater Hake of Cotton Incorporated, Mrs. Kay Sanford of The CH Foundation, Mr. Steve Verett and Mr. Shawn Wade of Plains Cotton Growers, Inc.