

Behnam Pourdeyhimi

The Nonwovens Institute
NC State University, Raleigh, NC, USA
email: bpourdey@ncsu.edu, web page: <http://www.TheNonwovensInstitute.com>

NONWOVENS: THE OTHER POROUS MEDIA

The nonwovens industry evolved organically to create an ecosystem to deal with the global challenges for improved safety for healthcare workers and patients in the 1940's and 50's... the industry has evolved into a thriving, innovative engine that provides engineered solutions for many industrial segments. The most significant market segments are:

1. Medical,
2. Hygiene,
3. Filtration,
4. Wipes,
5. Automotive and
6. Geosynthetics.

Nonwoven structures are porous media that are somewhat different from what we know as porous structures. Fibers within the structure form capillary networks and while the structure behaves as a porous medium, its behavior is different from classical porous media, but the particulars of how pores are formed and quantified is primarily driven by the fiber size, and the geometry of the structure. Nonwovens can have porous structures that range from the nanoscale to mezzo scale.

Nonwovens are produced by a variety of methods to form structures that deliver the necessary functions in large volumes and using automated processes.

This presentation will outline how we define and quantify these structures, and will discuss:

1. Structure simulation, visualization and modeling using 2D and 3D strategies
2. Structure-property relationships and 2D and 3D (X-ray and other methods) visualization methods used to model performance
3. Fluid flow through these structures – in-plane and through-the-plane and how they are modeled/ visualized
4. Filtration characteristics of such structures from mezzo scale to nanoscale
5. How pore size and porosity is controlled by fibers in the range of 100 microns to 20 nm,