

## **Characterization of Air Filtration Media Using Capillary Flow Porometer**

Akshaya Jena and Dr. Krishna Gupta\*

Porous Materials, Inc.  
20 Dutch Mill Road, Ithaca, New York

### **Abstract**

Air filtration media separate particles from air primarily by two mechanisms. The large particles are removed by sieving mechanism and the small particles are removed by adhesion to the surfaces of fibers. Therefore, the most constricted pore diameters, pore distribution, surface areas of through pores, and average fiber diameters are important for air filtration. Capillary flow porometry has the unique ability to measure all of these characteristics. Fibrous materials are normally used for air filtration in order to increase the surface area. For characterization of such filtration media in the porometer, air flow rates of a clean and dry sample is measured as a function of differential pressure. The pores of the samples are then allowed to be spontaneously filled with a wetting liquid and the flow rates of air are again measured as a function of differential pressure. The pore throat diameters of through pores and pore distributions are computed from wet and dry flow rates. The dry flow rate is used to compute the envelope surface area using the Kozeny-Carman relationship. The fiber diameter is computed from dry flow using the Davies equation. Measurement of pore throat diameters and surface area of through pores and average fiber diameters by capillary flow porometry is simple, fast, and reproducible. Pressure requirements are very small, and no toxic material or subzero temperatures are used. Results are presented to illustrate the applications and limitations.