

SP11 AN INSTRUMENT FOR MEASUREMENT OF ELECTROSPUN MEMBRANE THICKNESSES

Jianyu Zhou, Owen Roberts, George Chase

The University of Akron

Thickness is a crucial parameter of electrospinning submicron or nanofiber membrane in material performance study and properties characterization, such as porosity, and permeability. However, the high porosity and the small diameters of the electrospun fibers result in fluffy and compressible fabrics for which the thickness is difficult to measurement. Accurate measure of the thickness is desired for characterizing and comparing membrane performances. In this paper, we present a simple, fast, low cost method to measure membrane thickness using a small disk to apply a small (reproducible) force applied across a reasonably small area of the fiber mat. A traversing pin with high accurately known position via an encoder is moved to touch the tip of the pin to the flat surface of the disk. The contact of the pin with the disk completes an electrical circuit that is used to signal when the pin is in contact with the disk. The count of the encoder at the moment of contact determines the position of the pin and is used to determine the thickness of the mat. The instrument was calibrated with a series of known thickness plastic sheets in the range from 25 to 800 μm with about $\pm 0.8 \mu\text{m}$ error. Thinner mats can be measured with similar error. Application of the device to measure electrospun membranes is discussed.