

604e Forming of Integrated Webs of Nanofibers Via Electrospinning

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Electrospinning has gained renewed interest as a method to produce ultra-thin fibers with diameters in the nanometer to micrometer scale range. Much of this work is focused on producing single nanofibers that could potentially be wound for future use, or production of a mat of fibers. The effectiveness of these matted materials to uses, where improved transfer of energy or mass is desired, would be enhanced if the fibers were integrated or fused together. The fusion could be accomplished with post-treatment of the fibrous mat with a chemical or heat treatment, but creating an integrated web during the forming process would be desirable. This reasoning was the motivation for the study outlined below.

Poly(ethylene oxide) fibers were spun from solution into both fibrous mats and integrated fibrous mats where the fibers were fused at crossing points. By controlling the electrospinning process and the mat forming process, we can in effect turn on and off the fusing process during the formation. The results of a parametric study of the formation of these webs is presented showing the effect of various process parameters on the types of webs that can be formed as visualized with pictures obtained with images obtained from Scanning Electron Microscopy