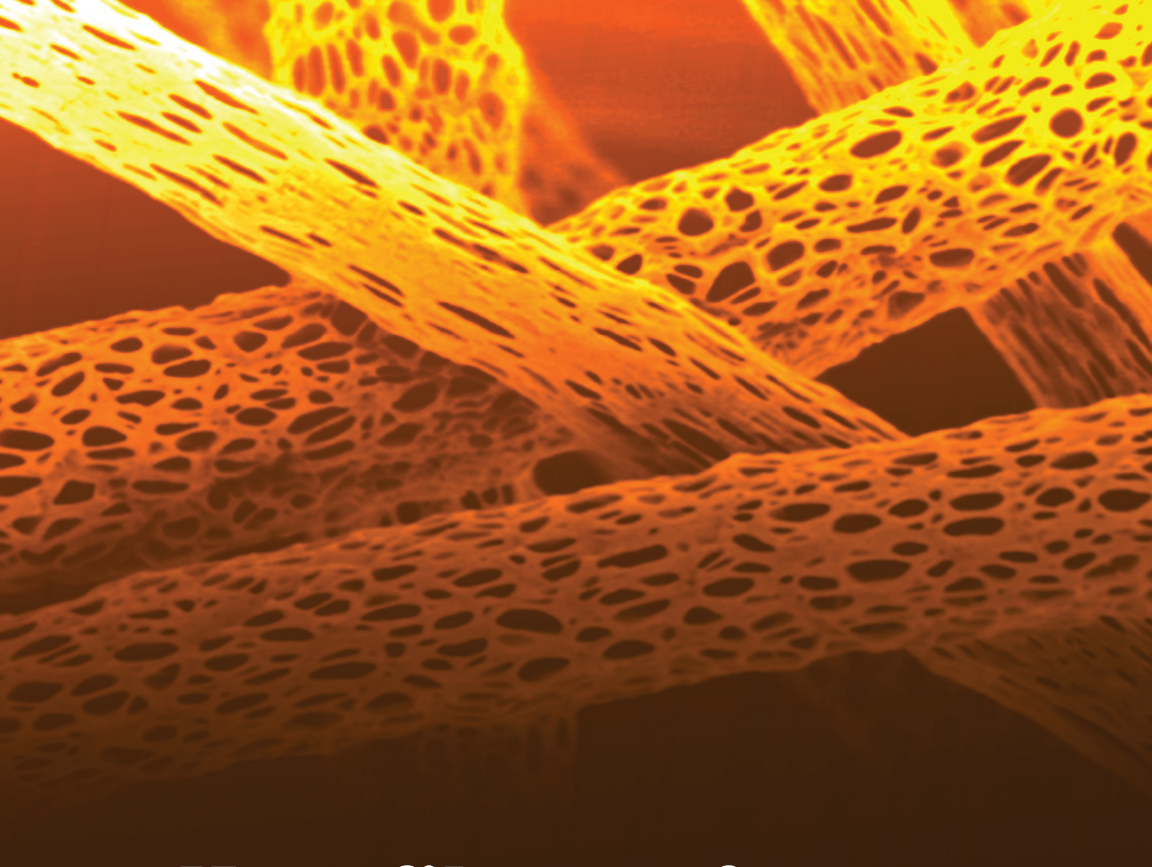

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Preface

Conjugated polymer composites with high dielectric constants are being developed by the electronics industry in response to the need for power-grounded decoupling to secure the integrity of high-speed signals and to reduce electromagnetic interference.

Electrically conducting polymers are materials which simultaneously possess the physical and chemical properties of organic polymers and the electronic characteristics of metals. Electrospinning based on the application of a static electric field on a polymer solution or melt through a spinneret appears to be a simple and well-controllable technique able to produce polymeric nanofibers. It is a versatile method for generating ultrathin fibers from a rich variety of materials that include polymers, composites, and ceramics. Due to its good adhesion to a number of substrates, and to some extent because it can be produced in large quantities, it can be used in emulsions, paints, adhesives, and various textile-finishing operations.

Conductive materials in fibrillar shape may be advantageous compared to films due to their inherent properties such as anisotropy, high surface area, and mechanical strength. Fibrous conductive materials are of particular interest in electroactive composites. Fine metal nanoparticles, carbon fibers, and carbon nanotubes have been efficiently distributed in an insulating polymer matrix in order to improve both electrical and mechanical properties.

Combination of electrical properties with good mechanical performance is of particular interest in electroactive polymeric technology. Fibers have intrinsically high structure factor that results in lower percolation threshold values avoiding material fracture with low filler content. Also, the use of mechanically stronger fibers will result in stronger composites.

Multifunctional micro- and nanostructures of conjugated polymers have received great attention. Some of them have several advantages, for example, pyrrole, aniline, and 3,4-etylenedioxythiopene have properties of easy polymerization, high conductivity, and good

thermal stability; but disadvantages of brittleness and hard processibility can be overcome by the production of their nanocomposites. Conjugated polymer composites as a nanofiber mat with different dielectric properties can be used in electronics industry, sensors, batteries, and electrical stimulation to enhance the nerve-regeneration process and for the construction of scaffolds for nerve-tissue engineering. Electrospinning is a technique used for the production of thin continuous fibers from a variety of materials including blends and composites. The extremely small diameters (~ nm) and high surface-to-volume and aspect ratios found in electrospun fibers cannot be achieved through conventional spinning.

This book covers general aspects, fundamental concepts, and equations of electrospinning used for the production of nanofibers and reviews latest researches on inclusion of conjugated polymer in different polymeric structures such as composites or blends of conjugated polymer nanofibers obtained by electrospinning.

Prof. Dr. A. Sezai Sarac
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