

Processing of Polymer-based Nanocomposites: Processing-structure-property-performance relationships: 199-227

## Electrospun polymer nanocomposites

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### ABSTRACT:

The present chapter gives an overview of the electrospinning process for producing nanofibers and developments in their application as polymer nanocomposites. Firstly, the electrospinning parameters (solution and process conditions), along with their effect on fiber morphology and properties, is elaborated. Thereafter, the incorporation of nanofibers (as nanofillers) into a (bulk) polymer matrix to generate electrospun polymer nanocomposites is described. The potential use of nanofibers as reinforcement in polymer nanocomposites, as well as their role as secondary reinforcements, is discussed. Morphology–property relationships provide an understanding of the effect of nanofiber dimensions and properties on the performance of such advanced functional materials. The nanofiber composite materials offer superior structural properties compared to their microscale counterparts, including a high modulus, and improved thermal and optical properties. Furthermore, the morphological properties of electrospun nanofiber-reinforced polymer nanocomposites are correlated with the structural properties along with their performance and applications. The various challenges, opportunities, and future trends are also highlighted.