

Structural-morphological correlation studies in polymeric nanofibers by SAXS and WAXD

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Electrospinning has been established as a technique to produce nano- and micron-sized fibers, seeking to address a growing interest in biomedical and tissue engineering, energy storage, and environmental applications [1]. The effectiveness of these fibers is sensitive to variation in molecular arrangement affecting the internal structure, being highly dependent on the polymer type, the spinning solution properties, and the spinning parameters [2].

In this study small- and wide-angle X-ray scattering providing detailed structural insights of Poly(vinylidene fluoride-co-hexafluoropropylene) (PVDFhfp) nanofibers has been performed. The experiments reveal that the nanofibers exhibit both densely packed aligned lamelle and fibrillar structures with alternating layers of crystalline and extended amorphous tie-molecules. In addition, WAXD profile shows an orthorhombic structure in nanofibers. Achieving an understanding of the surface morphology and the internal structure of nanofibers allows precise steering and controlling of nanofiber development during fabrication.

[1] Doshi J, et.al, J Electrostat., 35(2-3):151-60 (1995)

[2] Guex A. G. et. al, Macromol Mater Eng., 302(10):8 (2017)