Study the mechanical and electrical properties of coaxial electrospun P(VDF-TrFE)/P(VDF-TrFE-CTFE) nanofibers

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Abstract

P(VDF-TrFE) poly(vinylidene fluoride-trifluoroethylene) is a well-known piezoelectric electroactive polymer (EAP) with high crystallinity. If the third monomer (CTFE) is introduced to form P(VDF-TrFE-CTFE) poly(vinylidene fluoride-trifluoroethylene-chlorotrifluoroethylene), the ferroelectric domains will be fragmented into a relaxor ferroelectric domains which is nano polar region with high dielectric constant. In this study, we fabricated core-shell electrospun nanofibers by using coaxial electrospinning of P(VDF-TrFE) and P(VDF-TrFE-CTFE). We conducted wide angle x-ray diffraction (WAXD) to study the impact of lattice structure and crystallinity on the mechanical and piezoelectric properties. The coaxial electrospun nanofibers possess comparable Young's modulus with that of the mammalian muscles. The core/shell-TrFE/CTFE has higher piezoelectric coefficient (d33) of 50.5 pm/V, ascribed to the addition of terpolymer and the increase of crystallinity, suggesting a potentially promising candidate for artificial muscle actuator strain.

Keywords - Electroactive Polymer、Piezoelectric properties、PVDF-based、coaxial electrospinning、Wide Angle X-ray Diffraction

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