Sensors and Materials, Vol. 26, No. 2 (2014) 63–73
MYU Tokyo

S & M 0971

Poly(γ-benzyl α, *l*-glutamate) in Cylindrical Near-Field Electrospinning Fabrication and Analysis of Piezoelectric Fibers

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(Received June 10, 2013; accepted October, 8 2013)

Key words: cylindrical near-field electrospinning, piezoelectric fibers, PBLG

In this study, a cylindrical near-field electrospinning (CNFES) process was used to fabricate poly(γ-benzyl α, l-glutamate) (PBLG) fibers with permanent piezoelectricity. To analyze the piezoelectricity of various PBLG fibers, PBLG weight percentage, rotating tangential speed, electric field, and fiber diameter were investigated. The average diameter of the electrospun PBLG fiber is in the range from 4.37 to 25 μm with the optimum parameters (PBLG concentration: 18 wt%, tangential collection velocity: 942.4778 mm/s, and electric field: 6×10^6 V/m). Fourier transform infrared spectroscopy (FTIR) was used to characterize PBLG nonwoven fiber fabrics (NFFs) made by the CNFES process. The PBLG NFFs with high absorption peak at 1650 cm^{-1} corresponding to α-helix piezoelectric structures were demonstrated. In the experiment, the electrical energy output of one single PBLG fiber was characterized. The maximum power output is 138.42 pW with a load resistance of 8 MΩ. However, one single polyvinylidene fluoride (PVDF) fiber was also tested under the same condition and measurement. The power output is up to 265.81 pW with a load resistance of 6 MΩ. The results show that the power generation of the PVDF fibers exceeds that of PBLG fibers by 68%.

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