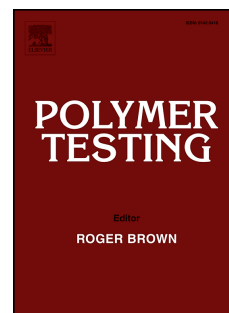


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Novel estimation of morphological behavior of electrospun nanofibers with artificial intelligence system (AIS)

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ABSTRACT

Electrospun nanofibers could be used as various high-performance devices to evaluate the new applications. Computational program design along with experimental achievements is needed for progress of nanofibers synthesis. In this study, artificial intelligence system (AIS) model has been used to study the morphological properties of electrospun nanofibers based on empirical data. For program designing, first, the most significant parameters including polymer concentration, voltage, and needle-to-collector distance on morphological properties of the electrospun nanofibers are determined, second, various AIS models are developed for prediction of morphology of electrospun nanofibers, and third, by comparing predictive validity of the developed AIS models and observed correlation, the best model is selected. The optimized AIS model with three input parameters, five neurons in first layer with tangent sigmoid transfer function, and one neuron in the second layer with linear transfer function was obtained. This model was able to predict the considered coefficient with $R^2 = 0.981$. The AIS analysis established that concentration of electrospinning solution and needle-to-collector distance were the main significant parameters altering the electrospun nanofibers morphology. Based on our best knowledge, the results of this research show that the optimized intelligence system can evaluate morphological behavior to an excellent level and is in good agreement with the electrospinning data.

Keywords: Nanofibers; Artificial intelligence system; Experimental data; Optimization; Prediction

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