Data in Brief 5 (2015) 41–44

Contents lists available at ScienceDirect

Data in Brief

journal homepage: www.elsevier.com/locate/dib

Data Article

Microscopy analysis and production rate data for needleless vertical rods electrospinning parameters

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ARTICLE INFO

Article history:
Received 12 March 2015
Received in revised form
31 July 2015
Accepted 10 August 2015
Available online 20 August 2015

Keywords:
Electrospinning
Polymer fibers
Electric fields

ABSTRACT

A multiple vertical rod setup for needless electrospinning was used to fabricate submicron polymer fibers. The design with multiple vertical rods is a new concept for increased production of electrospun fibers. Different geometries and operating conditions are possible. The effects of varying the number of rods in the array have been studied and reported [1]. The goal of this work was a proof of concept of the threaded rod design by exploring the effects of variations in applied voltage and gap distance for a fixed array of rods. Effects on fiber diameter and production rate of fibers are reported. More extensive experiments are needed to quantify the interrelations between parameters and to guide the design and operation of the method. No attempt was made to optimize the operating parameters or the geometry in terms of production rates or fiber diameters.
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Specifications table

Subject area	*Physics, Chemistry.*
More specific subject area	*Needleless electrospinning.*
Type of data	*Figure, Images (scanning electron microscopy).*
How data was acquired	*Fiber size distributions were determined from SEM images and their analysis using Fibraquant 1.3 software (Nanoscaffold Technologies LLC); Production rates were determined by measuring the mass of fibers collected per unit time.*

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http://dx.doi.org/10.1016/j.dib.2015.08.005
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Data format	*Analyzed, tabulated and plotted.*
Experimental factors	*6% PVP polymer was dissolved in ethanol to electrospin. Gap distances and applied voltages were varied.*
Experimental features	*Vertical rod spinning parameters (gap distance and voltage) affected the fiber size distributions and production rates of electrospun PVP fibers.*
Data source location	*University of Akron, Akron, Ohio, USA.*
Data accessibility	*Data is provided with this article.*

Value of the data

- The electrospun fiber production rates experimentally increased as the applied voltage increased. The changes in fiber size and production rates shown to be statistically significant using a one-way ANOVA analysis.
- The fiber diameter decreased as the distance between the collector and the plane of the rod arrays increased from 15.2 to 35.6 cm.
- The increase of distance between collector and electrically charged linear array of vertical rods significantly reduced the production rate to 0.005 g/min and was shown to be statistically significant verifies its significance in affecting the production rate.

1. Data, experimental design, materials and methods

Experimental details are described in reference [1]. The data presented here are for a vertical rod array geometry of 2 rods positioned in a planar linear array positioned parallel to a flat collector and backed by a secondary electrode. The rods were 50 cm long, spaced 6 cm apart, and the secondary electrode was 6 cm behind the plane of the rods. The secondary electrode had wings on each end also spaced 6 cm from the nearest rod. The geometry of the setup is shown in Fig. 1.

A 6 wt% solution of Polyvinylpyrrolidone (PVP, Aldrich, *MW*: 1,300,000) was prepared by dissolving PVP in ethanol (AAPER alcohol, 200 proof). It was used for fabrication of submicron-sized PVP fibers by a linear array of 2 vertical rods electrospinning setup. Secondary electrodes were positioned on one side of the linear array rods to direct the jets toward a planar collector surface (1680 cm^2).

In this data, the effect of applied voltage and gap distance between vertical rod and planar collector was investigated to compare the fiber morphology, diameter and production rate. Applied voltages are

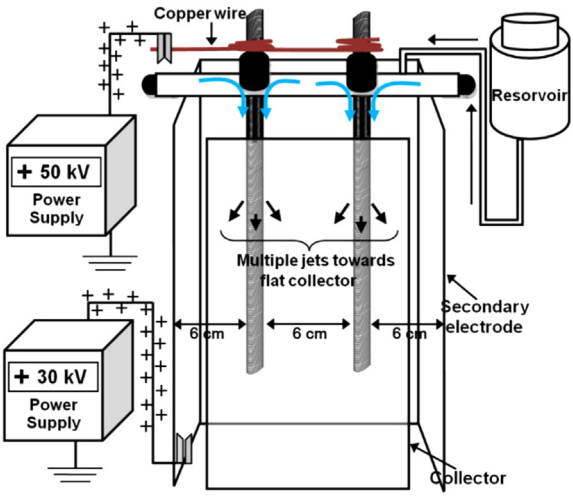

Fig. 1. Array with two vertical rods. The arrows show the general directions of the jets.

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