ABSTRACT

Electro spinning is a simple and versatile method of producing nanofibres, used in many applications. Theprocess is governed by a number of parameters, and the effects of these parameters vary depending on the material used.
Although the setup is simple, the process is complex and time-consuming, yielding very small amount of materials through hours of production. Multiple-nozzle electrospinning is a straightforward approach in increasing the production rate of
nanofibres. However, the addition of nozzlesusually causes processing problems and lower fibre quality due to electric field interference between nozzles and non-uniformity of the process, limiting the possibility of mass production. The aim of this
study is to investigate the effects of parameters in single- and multiple-nozzle electrospinning for future improvement of the method. In single-nozzle electrospinning, the effects and interaction between parameters were studied using response surface
methodology (RSM). An empirical model was developed to predict the average diameter of polyethylene oxide (PEO) nanofibres in response to concentration, voltage, and nozzle-collector distance. Statistical analysis shows that for the current
setup, the only significant parameter affecting fibre diameter is voltage. For the double-nozzle setup, the effects of voltage for internozzle distances of 1 and 2 cm were studied. Results show that jet deflection and fibre diameter can be reduced by increasing internozzle distance and reducing voltage