

Effect of polyvinylpyrrolidone and fabrication parameters on electrospun titanium oxide nanofibres' diameter

Abstract

Electrospinning is the most versatile and cost effective technique to produce titanium oxide (TiO_2) nanofibres. An ethanolic solution containing titanium tetraisopropoxide, polyvinylpyrrolidone and acetic acid was loaded in the syringe to produce TiO_2 nanofibres. In the present work, a custom-made electrospinning system was developed to investigate the fabrication and solution effects to the diameter of electrospun TiO_2 fibres. The fabrication parameters were applied voltage (kV), flow rate (ml/hr) and tip to collector distance (cm). In addition, the effect of varying the weightage of polymer carrier on electrospun TiO_2 nanofibres was investigated. The surface morphology of the fibres was examined with scanning electron microscope (SEM) and further analysed with the aid of JMicroVision. The significance of the influencing parameters was observed from high to low order as PVP content > tip to collector distance > applied voltage > flow rate. In conclusion, the parameters of applied voltage (15 kV), flow rate (1 ml/hr), tip to collector distance (10 cm) and PVP content (6 wt. %) are able to produce uniform TiO_2 nanofibres.