Abstract No: 70 ***Physical Sciences***

PANI/PCL BLENDED CONDUCTIVE AND BIODEGRADABLE NANO-FIBRE TWISTED YARNS FOR BIOMEDICAL APPLICATIONS

P.V.T. Weerasinghe[1], N.C. Rathnayaka[1], D.G.K. Dissanayake[1], N.D. Wanasekara[1*], W.P.T.D. Perera[2], N.D. Tissera[2] and R.N. Wijesena[2]

[1]Department of Textile and Clothing Technology, University of Moratuwa, Moratuwa, Sri Lanka
[2]Sri Lanka Institute of Nanotechnology, Nanotechnology and Science Park, Homagama, Sri Lanka
[*]nandulad@uom.lk

Development of polymer nano-fibres has a great scientific and technological attraction due to a vast array of applications in biomedicine and biotechnology. These nano-fibres have been found novel in applications such as biomimetic nanostructures that can act as extracellular matrix because of their porosity and higher surface area. This research was aimed at design and fabrication of conductive, biodegradable, and porous nanofibrous yarn comprised of polyaniline (PANI) and poly(3-caprolactone) (PCL) for three dimensional microporous scaffolds for tissue engineering applications. The nano-fibres were fabricated using a customised eletrospinning setup with a rotary collector. Electrospun mats were twisted into nanofibrous yarn. Electrical and mechanical properties of conductive yarns were evaluated for an array of PANI:PCL ratios. Yarn samples were characterised using scanning electron microscopy, differential scanning calorimetry analysis, and thermal gravimetric analysis. The applicability of nanofibrous yarns for biomedical applications were evaluated by testing biodegradability and in-vitro degradability. The results of this study demonstrated that PANI/PCL nano-fibres produced from PANI:PCL (4:16) solution exhibited the lowest resistance of 10 ± 4 MΩ cm^{-1}. The twisted plied yarns were incorporated into fabric by stitching or weaving to demonstrate the ability of constructing 3D microporous nano-fibre assemblies without disturbing the conductivity. It can be envisaged that this approach presents an early step on the way to the realisation of nano-fibre assemblies for tissue engineering.

Financial assistance from the University of Moratuwa (*Grant No. SRC/LT/2018/ 33) is acknowledged.*

Keywords: Biodegradable conductive, Eletrospinning, Polyaniline (PANI), poly(3-caprolactone) (PCL)