

8th International Conference on

TISSUE SCIENCE AND REGENERATIVE MEDICINE

September 11- 12, 2017 Singapore

Poly (3-hydroxybutyrate)-chitosan/alumina nanowires electrospun nanocomposite scaffolds for tissue engineering applications**Elahe Bahremandi Toloue, Saeed Karbasi and Mohammad Rafienia**
Isfahan University of Medical Sciences, Iran

Statement of the Problem: Already poly 3-hydroxybutyrate (PHB)-chitosan electrospun scaffold has been studied in tissue engineering applications. To enhance the mechanical properties of polymer based scaffolds, adding ceramic component to them has mostly been a proper solution. Alumina is one of the most biocompatible ceramics with good corrosion resistance and wear resistance. Studies show that, among various structures of ceramics, the fibrous structures are better than other structures for increasing the mechanical properties due to the possibility of aligning with the fibrous spun. In this research, the effects of alumina nanowires on the structural and mechanical properties of poly-3-hydroxybutyrate-chitosan electrospun scaffolds were evaluated.

Materials & Methods: Initially, 20 wt% of chitosan was added to a 0.09% wt. P3HB dissolved in trifluoroacetic acid solution. Al₂O₃ nanowires at different weight percentages (5% and 10%) were added to P3HB-chitosan polymer solutions and then spun.

Findings: Scanning electron microscopy (SEM) showed the average diameter of the fibers increased by increasing of Al₂O₃ nanowires from 336 to 494 nm. In addition, evaluation of porosity with the use of the MATLAB software program and SEM photomicrographs have been shown with increasing Al₂O₃ nanowires, porosity decreases from 82 to 81%. FTIR evaluations also showed the distribution of alumina nanowires in the composite scaffolds. The result of mechanical properties showed that tensile strength were 1.33 MPa and 1.07 MPa for the scaffolds containing 5 and 10% wt. alumina nanowires respectively, while 0.33 MPa has been measured for PHB-chitosan scaffold without alumina nanowires. It can be concluded that the addition of alumina ceramic nanowire has increased the mechanical properties of the polymeric scaffold, although adding of higher alumina percentages due to agglomeration has less effect on mechanical properties improvement.

Conclusion: Therefore, using Al₂O₃ nanowire in P3HB-chitosan electrospun scaffolds is a key to increase the mechanical properties of the mentioned scaffolds without undesirable effect on structural properties.

Biography

Elahe Bahremandi Toloue has received her BS degree in Physics from the University of Isfahan in 2007 and MS degree in Solid State Physics from the Islamic Azad University of Tehran in 2012. She is currently a Medical Engineering student pursuing second Master's degree at the Isfahan University of Medical Sciences.

e.bahremandi@yahoo.com

Notes: