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Coaxial electro-spinning of PCL/GT hybrid fiber for encapsulation and controlled release of doxycycline

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Polycaprolactone (PCL) and gelatin (GT) are popular biodegradable electrospinable polymers. PCL is non-toxicity, biocompatible and biodegradable and has been studied to form many medical devices, or scaffolds for tissue regeneration of *in vivo* and *in vitro* cell culture using serum added media. Gelatin natural polymer has been widely studied and exposed to various biomedical applications due to its excellent biocompatibility and biodegradability. Blending natural and synthetic polymers provides a new biomaterial with proper biocompatibility and improved mechanical, physical and chemical properties which is beneficial for cell adhesion and degradation rate. Doxycycline is an effective antibiotic, inhibitor of matrix degrading enzymes. It has been reported to treat bacterial infections in many different parts of the body, but serum half-life is very short. We evaluated the fabrication of PCL/GT electrospun fibers to provide controlled release of doxycycline antibiotic in a short and long term delivery. The fabricated scaffold loaded Dox will provide bacterial free environment for cell proliferation and tissue regeneration. PCL and gelatin were dissolved separately in tri-fluoro-ethanol (TFE). After complete dissolution, they were mixed together. Fibers fabricated from single, coaxial and tri-axial spinneret were compared and characterized for their, structural and morphology using scanning electron microscopy (SEM) and transmission electron microscopy (TEM). Dox released into the incubation medium over five days was determined using absorbance at 375 nm. Fourier transform infrared spectroscopy (FTIR) was performed to characterize various components fabricated fibers. 24-h viability of human umbilical vein endothelial cells was also evaluated. Obtained results suggested that the fabricated hybrid PCL/GT loaded Doxy fiber mats because of their unique fabrication process, release characteristics, and antibacterial. Properties could be used as a potential scaffold for tissue regeneration.

Biography

Abdurizzagh Khalf has completed his Master's degree in 2009 from Department of Chemical Engineering University of Stellenbosch- South Africa and he is currently a PhD candidate in the Department of Chemical Engineering at Oklahoma State University. He has published 4 papers in reputed journals. His research interests include nano-materials/nano-structure/nano-medicine.

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