

Title: Effect of core–sheath bi-polymeric scaffolds fabricated from acid-soluble collagen and poly(lactic acid) derivatives on wound healing

Author Names: Nasima Akter Mukta, Samina Ahmed, A.M. Sarwaruddin Chowdhury

Abstract: The core–sheath bi-polymeric scaffold has been proven as an encouraging material based on the requirement of scaffolds. This study aims to prepare electrospun core–sheath scaffolds by using acid-soluble collagen (ASC) as core material and poly(lactic acid) (PLA) or PLA-g-VAc as sheath material to get the most in combination from a hydrophilic and a hydrophobic polymer. ASC is extracted from waste Tilapia fish skin conserving the triple helix structure of the $\alpha 1$ (130 kDa) chain, and a $\alpha 2$ (120 kDa) chain cross-linked with the β (280 kDa) chain confirmed by amino acid profile, sodium dodecyl sulphate-polyacrylamide gel electrophoresis. PLA-g-VAc is prepared by grafting vinyl acetate (VAc) onto the PLA chain using benzoyl peroxide as the initiator. FT-IR, ^1H NMR, and ^{13}C NMR of PLA-g-VAc reveal that grafting occurs between the double bond of VAc and the methine group of PLA. The morphology of the scaffolds is determined by the field emission scanning electron microscope. FT-IR, thermogravimetric analysis, differential scanning calorimetry, XRD, and water contact angle measurements are used for further characterization of scaffolds. In vivo, cytotoxicity analysis on the Vero cell line exposes that scaffolds are biocompatible. Application of scaffolds to the surgically produced wounding of skin in a rat model followed by histological assay indicates the enhanced properties of core–sheath scaffolds rather than the single polymeric scaffolds..

Keywords: Core–sheath scaffold; Electrospinning; Acid-soluble collagen (ASC); Poly(lactic acid) (PLA); PLA-g-VAc;

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