

Title: RETRACTED: Hydroxyapatite and cellulose nanocrystals loaded gelatin-chitosan based electrospun nanofibrous mats for rapid wound healing

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Abstract: Electrospinning of a heterogeneous solution is difficult to continue because the required process parameters are different for multiple phases. In this study, nanofibrous mats were successfully prepared from a heterogeneous blend of solid cellulose nanocrystals (CNC) and hydroxyapatite nanoparticles (HAp) in a solution mixture of chitosan and gelatin using an electrospinning technique. HAp and CNC were used as filler materials in the nanofibrous mats. Gelatin and chitosan polymer chains in the mats were crosslinked using glutaraldehyde. The fiber diameter was noticed to decrease from around 86 to 43 nm with the increase of electrical conductivity of the spinning solution from 890 to 1166 $\mu\text{S cm}^{-1}$ and after crosslinking a significant variation in fibers' diameter was noticed. The elemental analysis data showed that around 85% of the HAp used in the spinning solution was passed through the nozzle and the rest of the portion remained settled in the spinning syringe. In the XRD study, the crystallinity of chitosan, HAp and CNC was not observed in the non-crosslinked and crosslinked mats. The TGA analysis showed that the crosslinked mat has no weight retention at 500 °C which is due to its complete amorphous nature. The mats showed single-phase transition temperatures in DSC analysis which proves that no segregation of materials was present in the electrospun fibers. FTIR analysis of the mats showed a new peak at 1205 cm^{-1} which suggests the Michael addition type reactions to be happened between chitosan and gelatin. Cytotoxicity analysis of the mats on the vero-cell line showed around 95% of cell viability. The prepared mats were applied as wound dressings on a mice model experiment and 50% faster healing of wounds on the mice was noticed for the non-crosslinked mats than the control one.

Keywords: Electrospinning, Gelatin/chitosan mixtures, CNC or HAp filler, Wound healing, Cytotoxicity

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