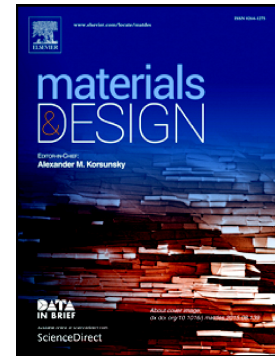


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A study of the effect of zinc oxide and zinc peroxide nanoparticles to enhance angiogenesis-pro-angiogenic grafts for tissue regeneration applications

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Abstract

Angiogenesis is a process of formation of new small blood vessels from existing vessels and is very critical for proper and rapid tissue healing. As reactive oxygen species (ROS) are known for their ability to promote angiogenesis, in this study zinc oxide (ZnO) and zinc peroxide (ZnO₂) nano-particles (NP's) encapsulated chitosan (CS) and cellulose based hydrogels were synthesized. ZnO₂ is comparatively stronger oxidizing agent as compared to ZnO, therefore, in this study it was hypothesized that ZnO₂ would deliver better angiogenic potential than ZnO. Three types of hydrogels were prepared; control hydrogel (without nano-particles), hydrogel having ZnO NP's and hydrogel having ZnO₂ NP's. The hydrogels were characterized by scanning electron microscopy (SEM) for structural morphology, Fourier transform infrared spectroscopy (FTIR) for chemical functional groups analyses and X-ray Diffraction (XRD) to investigate the crystalline or amorphous structure of NP's. The solution absorption capacity was tested in PBS and degradation was investigated in PBS, PBS/H₂O₂ and PBS/lysozyme solutions.

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