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Synergistic Effect between Titanium Oxide and Silver Nanoparticles in Polymeric Binary Systems

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Abstract : Both silver nanoparticles and titanium dioxide have been extensively used in tissue engineering since they've been approved by the Food and Drug Administration (FDA), and present a bactericide effect when added to a polymeric matrix. In this work, the focus is on fabricating binary systems with both nanoparticles so that the synergistic effect can be investigated. The systems were tested by Nuclear Magnetic Resonance (NMR), Thermogravimetric Analysis (TGA), Fourier-Transformed Infrared (FTIR), and Differential Scanning Calorimetry (DSC), and X-ray Diffraction (XRD), and had both their bioactivity and bactericide effect tested. The binary systems presented different properties than the individual systems, enhancing both the thermal and biological properties as was to be expected. The crystallinity was also affected, as indicated by the finding of the DSC and XDR techniques, and the NMR showed a good dispersion of both nanoparticles in the polymer matrix. These findings indicate the potential of combining TiO_2 and silver nanoparticles in biomedicine.

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