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Multifunctional Nanoparticle-Reinforced Polymer Scaffolds for Enhanced Bone Regeneration

Abstract:

This presentation highlights the development of biodegradable polymer scaffolds reinforced with a combination of nano-hydroxyapatite, nanoclay, and other bioactive nanoparticles to enhance both mechanical and biological performance. The nanocomposites exhibited improved strength, hydrophilicity, and controlled degradation, closely mimicking the structure of natural bone tissue. In vitro evaluations revealed enhanced osteogenic cell proliferation, mineralization, and biocompatibility compared to pure polymers. The synergistic effects of multiple nanoparticles provide a stable and bioactive environment for bone regeneration, making these scaffolds promising candidates for maxillofacial and orthopedic tissue engineering applications.

Biography

Samira Farjaminejad earned her PhD in Biomedical Engineering with research focused on polymeric nanocomposites for bone tissue engineering. She has worked as a lecturer and researcher in biomaterials, regenerative medicine, and drug delivery, and is currently based in London. Her work centers on developing smart scaffolds and nanoparticle systems for tissue regeneration. She has published several papers in international journals, including those by Elsevier and Springer Nature, and serves as a reviewer and editorial board member for reputed scientific journals in the field of biomaterials and tissue engineering.