

## **Fabrication of Cheap Novel 3d Porous Scaffolds Activated by Nano-Particles and Active Molecules for Bone Regeneration and Drug Delivery Applications**

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**Abstract :** Tissue engineering became a promising field for bone repair and regenerative medicine in which cultured cells, scaffolds and osteogenic inductive signals are used to regenerate tissues. The annual cost of treating bone defects in Egypt has been estimated to be many billions, while enormous costs are spent on imported bone grafts for bone injuries, tumors, and other pathologies associated with defective fracture healing. The current study is aimed at developing a more strategic approach in order to speed-up recovery after bone damage. This will reduce the risk of fatal surgical complications and improve the quality of life of people affected with such fractures. 3D scaffolds loaded with cheap nano-particles that possess an osteogenic effect were prepared by nano-electrospinning. The Microstructure and morphology characterizations of the 3D scaffolds were monitored using scanning electron microscopy (SEM). The physicochemical characterization was investigated using X-ray diffractometry (XRD) and infrared spectroscopy (IR). The Physicomechanical properties of the 3D scaffold were determined by a universal testing machine. The in vitro bioactivity of the 3D scaffold was assessed in simulated body fluid (SBF). The bone-bonding ability of novel 3D scaffolds was also evaluated. The obtained nanofibrous scaffolds demonstrated promising microstructure, physicochemical and physicomechanical features appropriate for enhanced bone regeneration. Therefore, the utilized nanomaterials loaded with the drug are greatly recommended as cheap alternatives to growth factors.

**Keywords :** bone regeneration, cheap scaffolds, nanomaterials, active molecules

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