

## A Green Approach towards the Production of CaCO<sub>3</sub> Scaffolds for Bone Tissue Engineering

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**Abstract :** It is well known that bioactive ceramics exhibit specific biological affinities, especially in the area of tissue regeneration. In this context, we report the development of an eminently scalable, novel, supercritical CO<sub>2</sub> based process for the fabrication of hierarchically porous 'soft' CaCO<sub>3</sub> scaffolds. Porosity at the macro, micro, and nanoscales was obtained through process optimization of the so-called 'coffee-ring effect'. Exposure of these CaCO<sub>3</sub> scaffolds to monocytic THP-1 cells yielded negligible levels of tumor necrosis factor-alpha (TNF- $\alpha$ ) thereby confirming the lack of immunogenicity of the scaffolds. ECM protein treatment of the scaffolds showed enhanced adsorption comparable to standard control such as glass. In vitro studies using osteoblast precursor cell line, MC3T3, also demonstrated the cytocompatibility of hierarchical porous CaCO<sub>3</sub> scaffolds.

**Keywords :** supercritical CO<sub>2</sub>, CaCO<sub>3</sub> scaffolds, coffee-ring effect, ECM proteins

**Conference Title :** ICBNN 2017 : International Conference on Biomedical Nanoscience and Nanotechnology

**Conference Location :** Zurich, Switzerland

**Conference Dates :** July 27-28, 2017