

Ultrasound micromolding of porous poly(lactide)/hydroxyapatite scaffolds

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Abstract. Ultrasound micromolding (USM) preparation of hybrid scaffolds based on polylactide (PLA) and hydroxyapatite (HAp) particles has been evaluated. PLA was stable under the applied ultrasound source since a minimum degradation was detected. Porous materials were achieved using polyethylene glycol (PEG) and NaCl salts to the initial PLA and the subsequent leaching of the micromolded specimens. To avoid cavitation and decomposition problems during micromolding, it was necessary to use HAp free of typical synthesis impurities like carbonate and nitrate compounds. Compact PLA/HAp pieces allowed a maximum HAp load of 60 wt%, while porous specimens could be obtained with a maximum load of 38 wt%. Physical characterization of new scaffolds was performed by X-ray diffraction, spectroscopic and calorimetric techniques, stress-strain tests and contact angle measurements. Results indicated that a degree of porosity of 35% and relatively good mechanical properties could be achieved (*i.e.*, 580 MPa, 4%, and 15.6 MPa for the Young modulus, elongation at break, and tensile strength, respectively). Scaffolds showed the positive effect of HAp and porosity on cell proliferation; this latter was 40% higher than that detected for non-porous PLA specimens.

Keywords: processing technologies, ultrasound micromolding, micropieces, hydroxyapatite, porous scaffolds

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