

Influence of Drying Method in Parts of Alumina Obtained for Rapid Prototyping and Uniaxial Dry Pressing

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Abstract : Developing new technologies in the manufacture of biomaterials is a major challenge for researchers in the tissue engineering area. Many in vitro and in vivo studies have revealed the significance of the porous structure of the biomaterials on the promotion of bone ingrowth. The use of Rapid Prototyping in the manufacture of ceramics in the biomedical area has increased in recent years and few studies are conducted on obtaining alumina pieces. The aim of this work was the study of alumina pieces obtained by 3D printing and uniaxial dry pressing (DP) in order to evaluate porosity achieved by this two different techniques. Also, the influence of the powder drying process was determined. The raw alumina powders were drying by freeze drying and oven. Apparent porosity, apparent density, retraction after thermal treatment were evaluated. The porosity values obtained by DP, regardless of method of drying powders, were much lower than those obtained by RP as expected. And for the prototyped samples, the method of powder drying significantly influenced porosities, reached 48% for drying oven versus 65% for freeze-drying. Therefore, the method of 3D printing, using different powder drying, allows a better control over the porosity.

Keywords : rapid prototyping, freeze-drying, porosity, alumina

Conference Title : ICBCN 2015 : International Conference on Biomaterials, Colloids and Nanomedicine

Conference Location : Paris, France

Conference Dates : January 23-24, 2015