DETERMINATION OF POLYMER INFILTRATION ABILITY IN *CORALINA*[R] HIDROXIAPATITE. SEM STUDY OF THE RESULTING COMPOSITE.

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Search of materials with biocompatibility, safeguard and with the functional capacity to be used as bone grafts was a subject of wide scientific and technologic importance in the last few years. Inorganic part of bones (65%) is principally Calcium Phosphates with similar composition of hydroxyapatite (biological apatite) and 35% is constituted by organic material and water. Collagen fibres are the main component of the organic material, which is in strong interrelation with biological apatite.

Bone structure and composition knowledge stimulated the research and development of biomaterials with specific composition, structure, porosity and *in vivo* biodegradation performance. At the present, there are a lot of these biomaterials. Actually many people works hard in the fabrication of compound or mixed materials (composites) formed by calcium phosphates and natural or synthetic polymers in order to obtain new products with properties (chemical, physical or mechanical) more alike to bone which allows better performance as bone graft substitute.

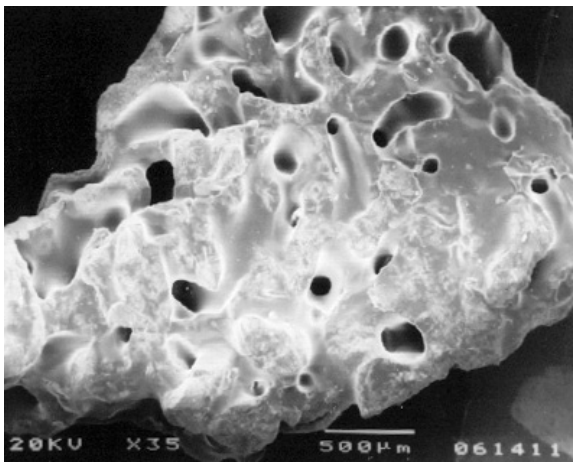
The aim of this contribution is to describe the formation and physicochemical characterization of a system composed by hydroxyapatite (Coralina® HAP-200) [1] and one polymer (POVIAC) [2]. Both biomaterials have great usefulness; as a high biocompatible bone graft substitute the first one, and as drug delivery support the second. The physicochemical characteristics of this composite, its mechanical properties and stability, and the easier way of fabrication, makes this system very suitable for bone tissues restoring applications and simultaneously medical treatment of different bone illness, using their drug delivery possibilities.

Coralina® HAP-200 hydroxyapatite granules were embedded in POVIAC and drained (Fig. 1a). Polymer solution (33%) covers homogenously outside surfaces and porous walls of the granules (Fig. 1b). Some porous become completely obstructed (Fig. 1c). The inner rupture face of granules shows the smooth surface of polymer film that covers porous walls (Fig. 1c), that contrast with the coarse original surface of the porous walls (Fig. 1d).

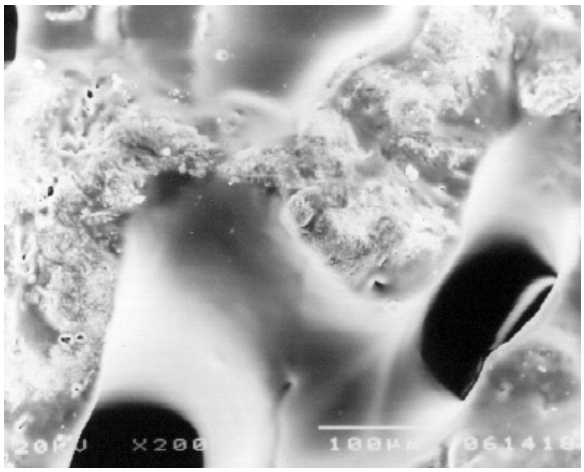
If we compare the original look of hidroxiapatite granules porous with the HAP-POVIAC composite, we can see the change in texture of the hidroxiapatite granules coarse original surface to the smooth surface of the polymer film that covers the inner and outer surface of the composite. It can be seen also the narrowing of the porous inner free space until the obstruction of some of them. This behavior was observed in composites with any POVIAC solution from 11 to 33 % concentration. This homogeneous covering of the hidroxiapatite porous walls can be observed even in deeper porous, proving the high infiltration ability of POVIAC in Coralina® HAP-200. SEM allows this type of study.

References:

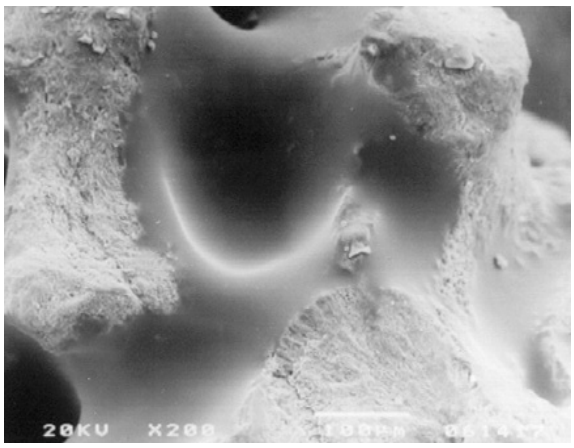
[1] R. González; MC. Melo; A. Pérez; AC Rodríguez. Hidroxiapatita Porosa Coralina HAP-200. Principales características Físico-Químicas. Química Nova, 16 (6): 509-512, 1993.
[2] A. Suzarte, E. Díaz, G. Jordán, G. Iglesias, M. Echevarría. "Procedimiento de obtención de polivinilacetato y copolímeros de acetato de vinilo- alcohol vinílico y empleo de los mismos como aglutinante y matrices de control de la entrega de fármacos". Patente cubana No. 22880-2003.



1a.



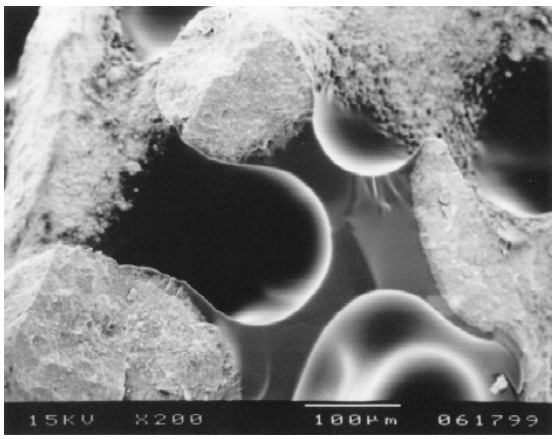
1b.



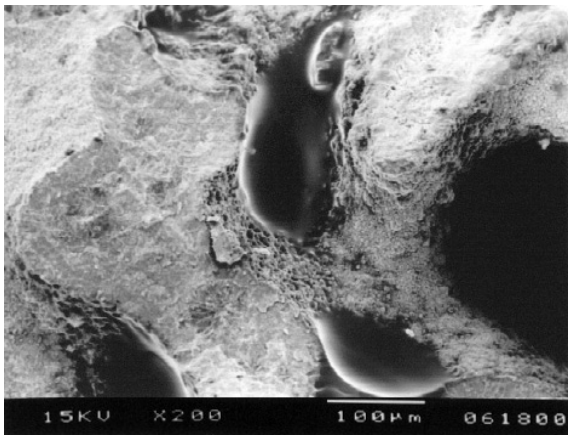
1c.

1d.

Fig. 1: HAP-200 XL granules embedded with POVIAC solution (33%). The polymer covers all the granule (a), the walls of all the inner porous (b) or the complete occlusion of some porous (c). Smooth texture of polymer film contrast with the coarse texture of the original wall surface of the porous (d).



2a.



2b.

Fig. 2a, b: The composite rupture faces shows that all polymer solutions infiltrate the hydroxyapatite micro porous