

## 3D PRINTING TECHNOLOGY: STUDY BASED ON NANO-SIZED CALCIUM PHOSPHATE AND PCL INK FOR BONE TISSUE REGENERATION

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The objective of this study was to obtain three-dimensionally (3D) printed scaffolds from nano-sized calcium phosphate (amorphous calcium phosphate; ACP) and polycaprolactone (PCL) ink for bone tissue regeneration (BTR). The synthesis of the nano-sized calcium phosphate was performed by wet method. The material was characterized by X-ray diffraction (XRD), infrared spectroscopy (FTIR), scanning electron microscopy (SEM) and determination of the surface area by adsorption of nitrogen. After obtaining the ink, cylindrical scaffolds (15x10 mm) were 3D printed. Mechanical strength, SEM, EDX and porosity were evaluated. Results of XRD analysis showed an intense peak at  $\theta=23.4$  corresponding to ACP, as well as other peaks of lower intensities corresponding to HA, ACP and OCP. The FTIR spectrum confirmed that the sample obtained corresponded to

the nano-sized calcium phosphate sample. Studies of viscosity showed that the composition of nano-sized calcium phosphate and PCL used was suitable for the preparation of the ink. The SEM analysis shows that the post-printed material maintains the cylindrical structure. It is also observed interconnected pores. On the other hand, the EDX analysis showed the presence of calcium and phosphorus. The analysis of microstructural characterization using the mercury intrusion porosimetry method showed that the porosity was around 70%. The mechanical resistance studies showed values within the range established for this type of material. The nano-sized calcium phosphate obtained through the synthesis process has the necessary quality to be used in the production of inks for 3D printing employed in BTR.

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