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Manufacture and characterization of biocomposite plates formed of poly (lactic-co-glycolic acid) (PLGA) with calcium phosphate (CA/P) for fracture fixation of bone

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The bone structure problems have been increasing worldwide due to an increase in longevity of the world population and cases of fractures, mostly in automobiles and work accidents. Among the materials used in the development of new biomaterials for the regeneration of bone tissue, we have bioresorbable polymers, especially the lactic polyacid (PLA). Commercially, there are several plates and screws for fixation of fractures of bone tissue made with PLA, however, its long time of degradation and lack of integration of this material with the bone structure has aroused the interest of researchers in the use of polymers with faster degradation, such as PLGA and in conjunction with bioceramics, in order to improve bioactivity, forming an integration with bone tissue. Based on this, in this work were manufactured bone fracture fixation plates with PLGA polymer matrix and combinations of 5 and 10% by mass of ?-tricalcium phosphate (?-TCP), nano-hydroxyapatite (n-HA), calcium phosphate with ionic substitution of magnesium (Mg-Ca/ P) and strontium (Sr- a/P) processed by microinjection. The results obtained by thermogravimetry (TGA) showed that there was a variation in the mass of the inserted ceramic to expected values (5% and 10% in mass) in all groups of biocomposites. In general, the Tg values obtained by dynamic mechanical analysis (DMA) increased in almost all the biocomposites and, also, there was an increase in the storage modulus (E') of the biocomposites for almost all groups of biocomposites, with the exception of 5% of n-HA, indicating an increase in the stiffness of biocomposites. In the flexural tests, the biocomposites obtained a great dispersion in the average values of fracture load, presenting lower values to pure PLGA. There were difficulties in processing of biocomposites with Mg-Ca/P and Sr-Ca/P, a factor that can be attributed to the lack of homogeneity in the material mixing process.