World life expectancy continues to increase, which leads to an increased incidence in bone degenerative diseases. The use of implants is a common practice in the treatment of bone lesions, but even with the availability of ceramic and metallic materials with the potential to replace the bone, none of these materials fully satisfies the requirements of bone replacement. A strategy to resolve this problem is the generation of nanometric coatings on metallic substrates in order to increase biocompatibility of the implant and enhance the interaction between the implant and bone. Hydroxyapatite stands out among the most commonly used biomaterials due to its excellent biocompatibility, and similar composition and structure than that of human bone. The electrophoretic deposition is a promising technic to obtain nanoparticle coatings due to its low cost and ease of operation and the possibility to be scaled to an industrial level, however, one of the main problems of the electrophoretic deposition of hydroxyapatite is the fact that its aqueous dispersions have low stability. The transformation of hydroxyapatite from precursors, like CaCO$_3$, is a very attractive strategy because the morphology control can be done during the synthesis and deposition of CaCO$_3$. In this project it was carried out the transformation of CaCO$_3$ deposits obtained by electrophoretic processes, in hydroxyapatite. Synthesis of CaCO$_3$ nanoparticles was performed via microwave irradiation starting from Ca(NO$_3$)$_2$, NaHCO$_3$ and sodium citrate as a stabilizer. CaCO$_3$ deposition was made on aluminum substrates for 6 h by varying the applied voltage. Finally, the transformation of the deposits in hydroxyapatite was carried out by immersing the plates in a solution of Na$_3$PO$_4$ in a reflux system. The plates were characterized before and after transformation by XRD, FTIR, AFM and SEM.

**Keywords:** Electrophoretic deposition, Calcium Carbonate, Hydroxyapatite

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