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Crystallographic study of hydroxyapatite nanoparticles synthesized at room temperature

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Hydroxyapatite nanoparticles were synthesized by sonochemistry-guided sol–gel method and calcined at 600, 750, and 900°C. The crystallographic study was carried out only on the samples calcined at 600 and 750°C, given that at 900°C was observed the formation of beta-TCP. This work aimed to synthesize pure nanostructured hydroxyapatite at room and low-calcination temperatures. The modified Scherrer equation, Williamson-Hall, traditional Scherrer equation, and Rietveld refinement methods were applied to determine the crystallographic study. The crystallographic results were compared with the particle size measurements obtained from the processing of the images by SEM. Also, the characterization of the samples was carried out by FTIR in order to identify the vibrational state of the functional groups belonging to the pure hydroxyapatite. The crystallite and particle size values, XRD and SEM, respectively, were slightly different but followed an ascending trend influenced by the calcination temperature. This difference between the crystallite and particle size may be due to coalescence. Regarding microstrains results, a certain degree of variation was also observed, possibly influenced by the microstructural rearrangement due to the calcination temperature.