



Synthesis of hydroxyapatite nanoparticles by hydrothermal method

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Progress in the nanotechnology has resulted in the development of many nanoscale structures of materials in different chemical, physical and biological properties for proper applications. Hydroxyapatite (HAP) is a major inorganic component of bone teeth that has been used extensively for biomedical applications due to its bioactive, biodegradable and osteoconductive properties. The chemical formula of HAP is $\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$.

The objective of our research was to synthesis of hydroxyapatite (HAP) through hydrothermal method that is very simple, cheap and effective. The particle size are controloed by varying the temperature from 90°C to 150°C and the morphology by varying the pH from 7 to 13. The phase composition and crystallinity of the hydroxyapatite were analyzed by X-ray diffraction (XRD) and Fourier transform infrared spectrograph (FT-IR). The TEM and SEM micrographs reveal that the particle morphology of hydroxyapatite are changed from short rod-like to long rod-like with the size from 78nm to 124nm, when temperature changing from 90°C to 150°C. The particle size are observed smaller (20-30nm) at 90°C and pH 11, exhibiting the morphology of short-rod. The ratio of length and width of the nano particle are decreasing from 4.17 to 1.65 with increas pH (7-11). The selected area diffraction are (SAD) indicated that the obtained particles are uniform rod-like monocrystals. The results of XRD and FT-IR spectrum are clearly indicated that the formation of HAP nano particle. The present results suggest that the hydrothermal method provides facile media for control of the phase and morphology of nanoscale HAP.