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SYNTHESIS OF NANO-HYDROXY-APATITE BY HYDROTHERMAL PROCESS FOR BIOMEDICAL APPLICATION

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There is an escalating interest in calcium phosphates, particularly apatites, which seems to be driven mainly by the requirements for the development, understanding, and manufacture of biomaterials. Compounds with the apatite ($Ca_{10}(PO_4)_6(F, Cl, OH)_2$) structure have been widely studied due to their potential applications as biomaterials catalysts ionic exchangers oxide ion conductors, and luminescent materials. Many synthetic strategies have been developed to produce these nanostructure, such as the solid-state reactions and sol-gel method. Recently, hydrothermal reactions have been used successfully as a non-traditional way of producing nanopowder, single crystals, and nanostructure. In this investigation, hydroxyapatite (denoted as HAp) nanostructure with uniform morphologies, controllable size, nano-dispersion and narrow-size distribution is diameter has been synthesized successfully by low-temperature hydrothermal process, and the as-synthesized powders were characterized by XRD, SEM, HRTEM, FT-IR, and ICP. In the present work, a novel technique of sonochemical of $CaHPO_4.2H_2O$/NaOH/distilled water with cetyltrimethylammonium bromide ($(CH_3(CH_2)_{15}N^+(CH_3)_3Br^-$) designated as CTAP) under hydrothermal condition to synthesize HAp nanostructure was described. Furthermore, the usage of a high basic condition a water environment is the two crucial keys in ensuring the formation of hydroxyapatite the hydrothermal/sonochemical processes. However, the crystallite size and crystallinity degree of the hydroxyapatite increased with the addition of annealing temperature. Indeed, present work will introduce new method in synthesizing hydroxyapatite for scientific and medical engineering. These high-quality hydroxyapatite nanorods represent well-defined nanoscale structure needed for both fundamental studies and clinical applications.