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STRUCTURE DIRECTING AGENTS ASSISTED HYDROTHERMAL SYNTHESIS OF NANOSCALE HYDROXYAPATITE FOR ORTHOPEDIC APPLICATIONS

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Calcium phosphate ceramics, such as hydroxyapatite have received a large interest in biomedical science, due to its excellent biocompatibility, non toxicity. It is the most important member of phosphate mineral group; mainly because it is the prototype of the inorganic material in hard tissues such as bone and teeth and is also regarded as an important implant material with significant clinical potential. These characters make hydroxyapatite ceramic a good candidate for application in orthopedics and dentistry. The chemical synthesis of hydroxyapatite came back to several decades ago, the synthetic methodology has been developing over the years in order to satisfy the requirements for various biomedical applications. Normally apatite materials were prepared either by wet chemical or by solid state reaction method. These conventional methods, mostly give irregular forms of powders with micro-sized particles. Bone itself is a composite consisting of hydroxyapatite (HAP) nano-rods embedded in the collagen matrix. Hence nano-sized HAP particles are desirable when bone substitute is considered. However, the hydrothermal method is very versatile for the synthesis of nanophase materials and has been well established but the control on morphology is very poor. It has been proved that the organized organic surface (surfactants) can control the nucleation of inorganic materials by geometric, electrostatic, and stereochemical complementarity between incipient nuclei and functionalized substrates. Therefore, it is believed that the combination of the two methods such as surfactants assisted hydrothermal technique might give a better result. In the present study, surfactant assisted synthesis of nano HAP was explored, the resultant material was characterized for the structural, chemical morphological properties.