

A Novel Bio-ceramic Using Hyperthermia for Bone Cancer Therapy, Ferro-substituted Silicate Calcium Materials

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Abstract : Ferro silicate calcium nano particles are prepared through the sol-gel method using polyvinyl alcohol (PVA) as a chelating agent. The powder, as prepared, is annealed at three different temperatures (900 °C, 1000 °C, and 1100 °C) for 3 h. The XRD patterns of the samples indicate broad peaks, and the full width at half maximum decreased with increasing annealing temperature. FTIR spectra of the samples confirm the presence of metal - oxygen complexes within the structure. The average particle size obtained from PSA curve demonstrates ultrafine particles. SEM micrographs indicate the particles synthesized have spherical morphology. The saturation magnetization (M_s) and remnant magnetization (M_r) of the samples show dependence on particle size and crystallinity of the samples. The highest saturation magnetization is achieved for the sample annealed at 1100 °C having maximum average particle size. The high saturation magnetization of the samples suggests the present method is suitable for obtaining nano particles magnetic ferro bioceramic, which is desirable for practical applications such as hyperthermia bone cancer therapy.

Keywords : hyperthermia, bone cancer, bio ceramic; magnetic materials; sol- gel, silicate calcium

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