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Study Of Magentic Properties Of Fe-Al Intermetallic Compound

Aniket Annasaheb Maske
India

FeAl intermetallic properties were studied with various Al wt%. It was found that with change in magnetic and physical - chemical properties with varying Al wt%. Experimental values were found to be in good agreement with the standard values. As a result, this intermetallic is useful in structural (not at high temperature i.e. above 6000C), agricultural, and automobile sectors. In this project, FeAl intermetallic was prepared with 3 varying Al wt. % by powder metallic route by SHS (self-prorogating high-temperature synthesis) and then by sintering at 6600C and 12000C respectively. Al wt.% was varied from 5 to 12 wt.% i.e. 10-40 at% Al, which was selected from Fe and Al binary phase diagram. The prepared FeAl intermetallic samples were characterized to get the information about the topography, density, micro-hardness and most important the magnetic properties with some standard measurement techniques. SEM showed some uniform dispersion of FeAl intermetallic in some phases with some standard results. Some aggregates of FeAl with different morphology were seen with different Al at%. Experimental density was changed with the standard one due to some change in the volume and densification in the synthesis process. EDAX examination showed especially coarsed grain in the powder sample had varying phase composition, bigger grain rich in Fe as compared to the small grains. Mossbauer showed the change in the magnetic properties with varying at% Al, as Disordered was seen to be ferromagnetic and ordered with higher than 30 at% Al as total Paramagnetic and it was a transition in between this at% Al range.

maskeaniket@gmail.com

In situ PCL microparticles loaded composite gels as an intra articular drug delivery system for the treatment of osteoarthritis (OA)

Arunkumar P., Indulekha S., Srivastava R. and Vijayalakshmi S.
Indian Institute of Technology, India

The main goal of the current work is to develop an *in situ* thermo-gelling composite system for intra articular delivery of drugs for OA. The composite *in situ* thermo-gelling chitosan system (CIG) comprises of Etoricoxib loaded PCL (Poly Caprolactone) microparticles embedded in an *in situ* forming chitosan gel, which gels at physiological temperature (37 °C). Etoricoxib loaded PCL microparticles is prepared by Oil/Water (O/W) emulsion solvent evaporation method. *In situ* chitosan thermogelling system is prepared by mixing 1.6% chitosan solution with 60% ammonium hydrogen phosphate (AHP) followed by incubation at 37 °C. The composite *in situ* gels (CIG) is prepared by dispersing PCL microparticles in the chitosan-AHP solution and incubated at 37 °C.The particles are found to be smooth and spherical using SEM. FTIR studies confirms the absence of any chemical interaction between PCL and Etoricoxib. The drug loading and entrapment efficiency are also determined. An *in-vitro* drug release study at pH 7.4 by dialysis-membrane method shows controlled release for around 20 days. Gellation time of CIG is determined to be 11 minutes. The drug is released in a much more controlled manner for CIG than PCL microparticles alone. The biocompatibility of the system is confirmed by performing *in vitro* cytotoxicity studies using MTT Assay in L929 cell lines. Thus to conclude, this novel composite *in situ* system can be a good, non-invasive intra-articular drug delivery system for the controlled delivery of drugs and proteins to the diseased joints.

Biography

Arunkumar P. is currently pursuing Ph.D. in centre for research in nanotechnology and science, IIT Bombay, Mumbai. He completed his masters in nanomedical sciences at Amrita Centre for Nanosciences and Molecular Medicine, Cochin. He has a proceeding publication titled “Efficient delivery system of nano silymarin to the prostate cancer cells” in the conference “Emerging trends in biotechnology 2012” organized by CUSAT, Cochin, India.

kumar.arun205@gmail.com