**Abstract**

Porous hydroxyapatite (HA) scaffolds with interconnected porosity have been successfully fabricated by using food grade gelatin as a gelling agent. Phase stability, chemical composition and topographical features of HA scaffolds were evaluated by X-ray diffraction (XRD), Fourier transform infrared spectroscopy and scanning electron microscopy respectively. XRD study revealed that additives used in the gel-casting process did not influence the phase composition of the investigated materials. The porosity of sintered scaffolds was assessed by the liquid displacement method and found to be 55–76 %. The pores were tailored to spherical shape and size in the range 300–400 nm, feature of utmost interest to clinicians for cell attachment, proliferation and development of soft tissues. Biocompatibility of HA scaffolds was evaluated via hemolysis studies. The results of hemolysis proved the highly biocompatible behavior of the synthesized HA scaffolds.