ABSTRACT

Thermal plasma spray coating is a well-established and popular technique for coating of variety of materials. The presents work deals with the plasma assisted spray coating to deposit HA extracted from eggshells by mechanochemical method on Ti substrates for different time durations ranging from 3 minutes to 15 minutes. Films were characterized before and after immersion in Stimulated Body Fluid (SBF) for investigation of appropriate interaction with physiological environments. The thickness of the coated films varies from 10 µm to 50 µm. XRD analysis confirmed the coatings of HA on Ti substrate and the variation in crystallite size, dislocation line density, stress and strain of coated films were evaluated for various deposition times before and after SBF immersion . The functional group and composition of coatings was also explored by using Fourier Transform Infrared (FTIR) spectroscopy which confirms the presence of phosphate bands and peak shifts after successful formation of a bioactive apatite layer on the HA coating. The surface morphology explored by SEM analysis reveals the growth of particulates and fragmentsof HA before emulsion. Their density and uniformity increase with deposition time, whereas, size distribution decreases significantly. After immersion, spongy and culiflower like structures are formed along with the precipitates which show extensive nonuniformity and cracks- formation for the highest coating time. Eggshell derived hydroxyapatite coated Ti-implants are highly cost effective and are potential candidate for achieving high osseointegration rate and increased biocompatibility with natural bone with significantly reduced infection and inflammation risks.