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# Micro-arc oxidation of bioceramic coatings containing eggshell-derived hydroxyapatite on titanium substrate

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## Abstract

In the present study eggshells-derived hydroxyapatite (EHA) coatings were successfully produced on Ti6Al4V substrates using micro-arc oxidation process (MAO) at various concentrations of EHA (i.e. 1, 1.5 and 2g/L) in an electrolyte consisting of tri-sodium orthophosphate. The atomic force microscopy, X-ray diffraction, attenuated total reflectance-fourier transform infrared spectroscopy, scanning electron microscopy and energy dispersive X-ray spectroscopy were used to analyze the coatings. A micro scratch tester, while the corrosion behavior of the MAO-coated substrate was determined by an electrochemical method. The results showed that the surface roughness of this was accompanied by a reduction in the porosity due to the formation of a dense layer. This has also resulted in an increased in the surface roughness. The MAO-coated substrate prepared with 1.5g/L EHA concentration exhibited a well-formed coating layer with improved adhesive strength and excellent corrosion resistance. The mechanism of EHA-coating formation as well as the enhanced corrosion resistance of the coated substrates were discussed. This research shows the viability of using calcium-rich waste eggshells to produce phase pure HA suitable for coating on Ti6Al4V substrate using MAO method.

## Keywords

Eggshells-derived hydroxyapatite; HA; Titanium; Ti6Al4V; Micro-arc oxidation (MAO)

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