Recent development of calcium phosphate-based coatings on titanium alloy implants

Abstract

Titanium alloy implants are widely employed in biomedical devices and components, especially as hard tissue replacements as well as orthopaedic applications, owing to their favourable properties such as high-strength to weight ratio, low density, low Young’s modulus and biocompatibility. However, metallic implants cannot meet all of the clinical requirements. Therefore, in order to increase their clinical success and long term stability in the physiological environment, surface modification is often performed. This review focuses on the latest achievements in the field of surface modification techniques including sol-gel, thermal spray, magnetron sputtering, electrophoretic deposition and micro-arc oxidation of biocompatible calcium phosphates (CaP) based ceramics. Coatings for metallic implants with emphasis on the structure, morphological characterization, phase transformation and coating composition. A reflection on the results shows that CaP coatings can be grown with the each type of techniques and a stronger fixation can be enhanced with CaP fabrication on metallic implants. Advantages and limitations of the aforementioned techniques of CaP-based coatings from the point of view.