

Fabrication of Wollastonite/Hydroxyapatite Coatings on Zirconia by Room Temperature Spray Process

Authors : Jong Kook Lee, Sangcheol Eum, Jaehong Kim

Abstract : Wollastonite/hydroxyapatite composite coatings on zirconia were obtained by room temperature spray process. Wollastonite powder was synthesized by solid-state reaction between calcite and silica powder. Hydroxyapatite powder was prepared from bovine bone by the calcination at 1200°C 1h. From two starting raw powders, three kinds of powder mixture were obtained by the ball milling for 24h. By using these powders, wollastonite/hydroxyapatite coatings were fabricated on zirconia substrates by a room temperature spray process, and their microstructure and biological behavior were investigated and compared with pure wollastonite and hydroxyapatite coatings. Wollastonite/hydroxyapatite coatings on zirconia substrates were homogeneously formed in microstructure and had a nanoscaled grain size. The phase composition of the resultant wollastonite/hydroxyapatite coatings was similar to that of the starting powders, however, the grain size of the wollastonite or hydroxyapatite particles was reduced to about 100 nm due to their formation by particle impaction and fracture. The wollastonite/hydroxyapatite coating layer exhibited bioactivity in a stimulated body fluid and forming ability of new hydroxyapatite precipitates of 25 nm during in vitro test in SBF solution, which was enhanced by the increasing wollastonite content.

Keywords : wollastonite, hydroxyapatite composite coatings, room temperature spray process, zirconia

Conference Title : ICEMA 2015 : International Conference on Engineering Materials and Applications

Conference Location : Boston, United States

Conference Dates : April 20-21, 2015