

Spark Plasma Sintering and *In Vitro* Study of RF Plasma Processed HA Powders

J. L. Xu¹, K. A. Khor¹, Y. W. Gu², W. M. Soon¹, P. Cheang³

¹*School of Mechanical & Production Engineering*, ³*School of Materials Engineering*,
Nanyang Technological University, Singapore

Tel: 65 6790 5526 fax: 65 6791 1859 E-mail: mkakhor@ntu.edu.sg

ABSTRACT

Spray-dried (SD) hydroxyapatite (HA) was processed through a radio frequency (RF) plasma system. Results indicated that HA has lightly decomposed into α -TCP and TTCP after RF plasma processing. The processed powders were sintered at 1000°C, 1100°C and 1200°C for 3 min, respectively, through a spark plasma sintering (SPS) system. Only HA phases were detected in the SPS compacts. The relative densities increased from about 89% to around 98% with an increase in sintering temperature. In order to study the bioactivity of the sintered compacts, they were immersed in simulated body fluids (SBF) with an ion composition similar to human blood plasma in various incubation periods (maximum of 4 weeks). It was found that a layer of bone-like apatites was formed on the surface of the compacts. The evolution of the element concentrations in the SBF over different soaking periods were analyzed using inductively coupled plasma (ICP) atomic emission spectrometer. Results indicated the precipitation of calcium and phosphorus which led to the formation of apatite layers on the compacts surfaces.

Keywords: HA, RF plasma, Spark plasma sintering, SBF, ICP