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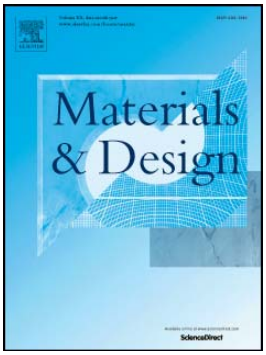

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Muhammad Rafi Raza, Abu Bakar Sulong, Norhamidi Muhamad, Majid Niaz Akhtar, Javad Rajabi

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EFFECTS OF BINDER SYSTEM AND PROCESSING PARAMETERS ON FORMABILITY OF POROUS Ti/HA COMPOSITE THROUGH POWDER INJECTION MOLDING

Muhammad Rafi Raza [1,*], Abu Bakar Sulong[1], Norhamidi Muhamad[1], Majid Niaz Akhtar[1, 2], Javad Rajabi[1]

1- Department of Mechanical and Materials Engineering, Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia, 43600, Bangi, Selangor, Malaysia

2- Department of Physics, COMSATS Institute of Information technology, Lahore Pakistan

Abstract

Porous Titanium-hydroxyapatite (Ti/HA) composite is a developed composite material suitable for bio-medical applications. Powder injection molding (PIM) with space holder method is used to produce porous Ti/HA with mechanical properties, similar to human bone, and pores helps to initiate tissue growth. However, the differences in physical and mechanical properties of these composites are the main challenges during debinding and sintering. Therefore, the main objective is to determine effects of binder systems and processing parameters on formability of Ti/HA composite. In PIM, a binder system is necessary to produce green and ultimately sintered part. There are two binder systems and variation of sintering temperature has been used. Results revealed that Polyethylene glycol (PEG) -based binder system is applicable with NaCl space holder and optimum sintering parameters, including temperature, heating rate, and holding time of 1300 °C, 10 °C/min, and 5 h, respectively. The fabricated porous Ti/HA exhibits average porosity, pore size distribution, compressive strength, and roughness values of 55%, 60 µm to 170 µm, 370 MPa, and 0.323 µm, respectively. FESEM results showed that the pores are interconnected. It may be an appropriate material for future bio-medical applications.

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