Size control in porosity of hydroxyapatite using a mold of polyurethane foam

Abstract

The optimum sized polyurethane foam (PUF) was used as a mold for the formation of porous hydroxyapatite, HAp (calcium phosphate cement-base). Four PUFs of different formulations were selected based on their cell size and the percentage of open cell structure. In the preparation of porous HAp, tetracalcium phosphate and dicalcium phosphate anhydrous were mixed at a molar ratio of 1:1 in the presence of a cement setting solution namely, sodium phosphate. The effects of the morphology and the cell size of PUF on the HAp morphology were analyzed with a scanning electron microscope. Based on the analysis, it was observed that only PUFs with an average cell size of approximately 600 μm and a 95 % open cell structure could optimally generate porous HAp. This result showed 35 % enhancement in porosity compared to the reported values. This porous HAp fulfiled the two criteria for an ideal porous implant which include a cell size of more than 100 μm and a high percentage of open cell content (>50 %).