

Synthesis of Antibacterial Bone Cement from Re-Cycle Biowaste Containing Methylmethacrylate (MMA) Matrix

Authors : Sungging Pintowantoro, Yuli Setiyorini, Rochman Rochim, Agung Purniawan

Abstract : The bacterial infections are frequent and undesired occurrences after bone fracture treatment. One approach to reduce the incidence of bone fracture infection is the additional of microbial agents into bone cement. In this study, the synthesis of bone cement from re-cycles biowaste was successfully conducted completed with anti-bacterial function. The re-cycle of biowaste using microwave assisted was done in our previous studies in order to produce some of powder (calcium carbonate, carbonated-hydroxyapatite and chitosan). The ratio of these powder combined with methylmethacrylate (MMA) as the matrix in bone cement were investigated using XRD, FTIR, SEM-EDX, hardness test and anti-bacterial test, respectively. From the XRD, FTIR and EDX were resulted the formation of carbonated-hydroxyapatite, calcium carbonate and chitosan. The morphology was revealed porous structure both C2H3K1L and C2H1K3L, respectively. The antibacterial activity was tested against *Staphylococcus aureus* (*S. aureus*) for 24 hours. The inhibition of *S. aureus* was clearly shown, the hollow zone was resulted in various distance 14.2mm, 7.5mm, and 7.7mm, respectively. The hardness test was depicted in various results, however, C2H1K3L can be achieved 36.84HV which is closed to dry cancelous bone 35HV. In general, this study results was promising materials to use as bone cement materials.

Keywords : biomaterials, biowaste recycling, materials processing, microwave processing

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