

Production of a Polymer Matrix Composite Material with Antibacterial Property

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Abstract- In this study, in an effort to develop polymer matrix composite materials, especially to be employed as workbench and kitchen bench usage, powdered waste porcelain was used as a filler to form satisfactory mechanical properties together with *Salvadora persica* (Miswak) in order to impart antibacterial effect to the material. The waste porcelain is obtainable from the local ceramic industries in quantities amounting upto 5% of their production output. While it is known that powdered ceramic fillers enhance mechanical properties of polymer matrices, recycling the large quantities of waste ceramic materials is the economic aspect of the study. On the other hand, antibacterial work benches would be desired for obvious health reasons. Miswak with a combination of its phytochemicals content was shown to inhibit the growth of a large spectrum of gram positive and negative bacteria. The waste porcelain was crushed and milled to a particle size of below 100µm. The porcelain powder and the Miswak stem powder were wet milled together and subsequently dried under vacuum for a homogeneous powder mixture. The polymer matrix composites were produced by die casting. The mechanical properties were determined by the measurement of bulk density, porosity, strength, impact resistance, shore hardness. The microstructure was investigated by SEM-EDX, XRD methods. The antimicrobial activity tests of the surfaces were conducted according to ASTM E2180-07 (Standard Test Method for Determining the Activity of Incorporated Antimicrobial Agent in Polymeric or Hydrophobic Materials). The microorganisms used were *Staphylococcus aureus* (ATCC 6538) and *Pseudomonas aeruginosa* (ATCC 15442) bacteria.

Key Words- Polymer matrix composite, waste porcelain, Miswak, antibacterial bench