

Polymethylmethacrylate- montmorillonite composites: preparation, characterization and properties

Nehal Salahuddin^{a,*}, Mohamed Shehata^b

^aDepartment of Chemistry, Faculty of Science, Tanta University, Postal No. 31527, Tanta, Egypt ^b Department of Dental Materials, Faculty of Dentistry, Tanta University, Tanta, Egypt

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Abstract

The objective of this work was directed to solve a problem of polymerization shrinkage in acrylic resin polymethylmethacrylate (PMMA) material. Organophilic montmorillonite (clay tone) was added up to 1% by weight to one commercial type of PMMA powder to form PMMA-MMT composite. Acrylic specimens were processed by the conventional heat curing method following manufacturer's instructions. Thermogravimetric analysis data indicates that polymer-clay composites exhibit significant increase in thermal stability with very small amount of inorganic content. The morphology of the composites was verified using scanning electron microscopy revealing the absence of large mineral aggregates. Interlamellar spacing was measured from wide angle X-ray diffraction. The d(001) spacing of clay was expanded to 18 Å in clay tone and the intensity of the peaks is progressively reduced with increasing the concentration of polymer in the composite samples. Warpage and linear dimensional change measurements were achieved using 'traveling microscope' and one way analysis of variance was employed to compare results. The results indicated that there was a significant decrease of warpage and linear dimensional changes between PMMA specimens and that of PMMA-MMT composite materials. © 2001 Elsevier Science Ltd. All rights reserved.