

A Study of Flexural Properties of Polymethyl Methacrylate Reinforced with Various Amount of Silanized Nano Alumina

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Abstract

Methods: Concentrations of silane coupling agent were calculated and analyzed by organic element analysis. The concentration was used for silanization of nano-alumina particles and silanized nano-alumina particles were mixed with acrylic resin at 0.25, 0.5, 0.75, 1, 3 and 5% w/w, producing the experimental groups. The control group was acrylic resin without nano-alumina. The specimens were 10 mm in width, 64 mm in length and 3.3 mm in thickness. Flexural strength and modulus of elasticity were investigated for all groups and were analyzed using one-way ANOVA at 95% confidence intervals.

Results: The concentration of silane coupling agent that forms monolayer on nano-alumina particles was 0.118 g for nano-alumina particles 1 g. The average flexural strength ranged between 75.86-100.63 MPa. The average modulus of elasticity ranged between 3.06-3.92 GPa.

Conclusions: The highest average flexural strength was found in the 0.25% w/w silanized nano-alumina group (100.63±14.05 MPa) and was significantly different from control group. The highest average modulus of elasticity was found in the 0.5% w/w silanized nano-alumina group (3.92±0.81 GPa) and was significantly different from control group.

Keywords: flexural strength, methyl methacrylate, modulus of elasticity, nano-alumina particles, silane coupling agents