



Mechanical properties of resin composite reinforced with synthesized nano-structured hydroxyapatite

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Abstract : This study aimed to prepare nanostructured hydroxyapatite (nHAp) by sol-gel method and assess the influence of its incorporation with different concentrations into a dental resin composite. The prepared nHAp powder was characterized by X-ray diffraction (XRD), infrared spectrum (IR), and scanning electron microscopy (SEM). nHAp was added to a commercial dental resin composite at four different concentrations (0, 1.5, 2, and 5 wt%). Nanostructured HAp incorporated dental resin composites were tested for their micro-hardness (VHN), degree of monomer conversion (DC), flexural strength (FS). The data were analyzed using one-way ANOVA and Tukey's post hoc test ($P \leq 0.05$). The results of characterization indicated that; HAp formed in small particles with aggregates have the particles <80 nm. The incorporation of 2 wt% nHAP revealed statistically significant highest mean micro-hardness values (104 ± 1.7), and flexural strength (203.6 ± 27.3 MPa), compared to other nHAp concentrations. The incorporation of nHAp did not influence the degree of monomer conversion, which was higher than 50% with 20 seconds of photo-polymerization for all tested groups. The analysis of results showed that the incorporation of 2 wt% of nanostructured hydroxyapatite into a dental resin composite had positively influenced the mechanical properties. Also, the inclusion of nanostructured hydroxyapatite increased the tested mechanical properties of the dental resin composite and might be promising filler for dental resin composites.

Keywords: hydroxyapatite synthesis; mechanical properties, resin composite.

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