DENTAL COMPOSITES WITH ENGINEERED INTERFACES

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Dental composites are materials widely used in the aesthetics dentistry since the 1960's. The development of the special adhesive systems has reduced the polymerization shrinkage, but has increased the residual stress at cavity walls. The generated stress usually results in some undesirable consequences such as formation of marginal of gaps, cusp fracture of posterior teeth and enamel. In this work, two types of rubber-modified composites were synthesized: (1) composites containing particles with grafted rubbery chairs and, (2) composites containing the rubbery chairs impregnated within the matrix. Components, which are similar to the commercial dental composites, were used: bis-GMA/tetraEGDMA. The mechanical behavior was evaluated using a three point bending test. The composites were analyzed via: scanning electron microscopy, spectroscopy of energy dispersive de X-rays, real time infrared spectroscopy. To determine the stress generated by the polymerization, a universal mechanical testing machine was used. The results showed that inorganic particles with grafted rubbery polymer that was also miscible in bis-GMA/tetraEGDMA led to the production of composites having higher mechanical properties and lower polymerization stress than composites containing only silanated particles. The process that tested the incorporation of the miscible polymer into the bis-GMA/tetraEGDMA matrix did not show evidences of enhancement in properties. Results indicate that the modifications in composites developed in this work can be very useful in the formulation of new dental composites with improved behavior when compared with the commercial ones used today.