

Title: Color and Luminescence Stability of Selected Dental Materials In Vitro

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Abstract: Purpose: To study luminescence, reflectance, and color stability of dental composites and ceramics. Materials and Methods: IPS e. max, IPS Classic, Gradia, and Sinfony materials were tested, both unpolished (as-cast) and polished specimens. Coffee, tea, red wine, and distilled water (control) were used as staining drinks. Disk-shaped specimens were soaked in the staining drinks for up to 5 days. Color was measured by a colorimeter. Fluorescence was recorded using a spectrofluorometer, in the front-face geometry. Time-resolved fluorescence spectra were recorded using a laser nanosecond spectrofluorometer. Results: The exposure of the examined dental materials to staining drinks caused changes in color of the composites and ceramics, with the polished specimens exhibiting significantly lower color changes as compared to unpolished specimens. Composites exhibited lower color stability as compared to ceramic materials. Water also caused perceptible color changes in most materials. The materials tested demonstrated significantly different initial luminescence intensities. Upon exposure to staining drinks, luminescence became weaker by up to 40%, dependent on the drink and the material. Time-resolved luminescence spectra exhibited some red shift of the emission band at longer times, with the lifetimes in the range of tens of nanoseconds. Conclusions: Unpolished specimens with a more developed surface have lower color stability. Specimens stored in water develop some changes in their visual appearance. The presently proposed methods are effective in evaluating the luminescence of dental materials. Luminescence needs to be tested in addition to color, as the two characteristics are uncorrelated. It is important to further improve the color and luminescence stability of dental materials.

Author Keywords: Color and Luminescence; Staining Drinks; Stability; Total Luminescence Matrices; Laser-Induced Luminescence; Color Parameters; Dental Composites; Color Difference Values

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