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Optical properties of nanocomposites

In traditional composites, micron sized particles or agglomerates typically cause significant light scattering, hampering natural restorations; in nanocomposites the particle dimensions are small enough to produce highly translucent fillings. Color, spectral reflectance (R%), scattering (S), absorption (K), translucency parameters (TP), transmittance (T%) were calculated for translucent (Trans), enamel (E), dentin (D) shades of a nanocomposite. The relative spectral radiance of each sample was measured against white and black ceramic tile backgrounds using a spectroradiometer. Specimens were measured inside a color-assessment cabinet under constant D65 CIE standard illumination; illuminating/measuring configuration corresponded to CIE d/0°. Color coordinates in CIELAB color space: L^* , a^* , b^* and the attributes of the color C^* (chroma) and h° (hue angle) were calculated from the spectral reflectance data. S and K coefficients from Kubelka-Munk theory were calculated algebraically from the spectral reflectance data of each specimen. TP values were determined by calculating the color difference in CIELAB color space between readings against black and white backgrounds for the same specimen. Statistical analysis was performed using a one-way analysis of variance (ANOVA) and Tukey's multiple comparison tests with Bonferroni correction. Tran's shades showed the lowest mean R%, S and K values and the highest mean TP and T% in comparison with E and D shades. Nanofillers enable an improvement in the material's esthetic and optical properties. There is a significant increase for precision of shade characters with higher translucency, thus providing excellent finish and gloss retention to the restoration.

Biography

Dondi dall'Orologio Giovanni, a doctor in Medicine at the University of Bologna in 1969, achieved the post graduated title of specialist in dentistry. He was appointed as an Assistant Professor in 1973 and became an Associate Professor in 1983. He is the Head of the Division of Conservative Dentistry from 1973 to 2014 and Director of the Master's program in Clinical Dentistry with Advanced Technology from 2003 to 2014. He experimented with new technology with a spectrophotometer; this led to the development of a new machine for reading the color of composite restorations *in vivo*. He has published more than 75 papers in reputed international journals.

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