

Translucency of CAD/CAM Ceramics

Purpose: To measure the translucency parameter (TP) of CAD/CAM ceramics.

Methods:

Four unshaded zirconia ceramics [*BruxZir* (Glidewell Laboratories), *Lava Plus* (3M ESPE), *NexxZr T* (Sagemax) and *Zenostar Zr* (Ivoclar Vivadent, Inc.)] were tested. The specimens (n=5) were square (12 mm x 12 mm ± 0.5 mm) with thicknesses of 0.5 and 1.0 mm ± 0.05 mm (parallel faces). The specimens were cut to approximate length and width dimensions using 1.5-inch diamond-cutting wheel. They were then sliced to a thickness 0.2 mm greater than required using a diamond saw. Based on previously determined shrinkage factors, the specimens were ground with 600-grit SiC paper to the thickness needed to attain final sintered dimensions. Each material was sintered using the heating and cooling profile recommended by the manufacturer.

Color measurements were performed using a *Color-Eye* spectrophotometer (*X-Rite*). The translucency parameter (TP) was calculated as the difference in L*a*b* readings of specimens recorded against white and black backgrounds in reflectance mode. The differences between the reflection values against the two backgrounds were calculated at every 10 nm within the 360-750 nm range.

Means and standard deviations were determined. The data were analyzed by analysis of variance. Fisher's PLSD multiple comparison test was calculated at the 0.05 level of significance.

Results:

The translucency parameters for four zirconia ceramics at thicknesses of 0.5 and 1.0 mm are listed in the Table. Curves of the differences between the reflection values against the two backgrounds versus wavelength at thicknesses of 0.5 and 1.0 mm are shown in Figures 1 and 2, respectively.

Table. Translucency Parameter (TP) of four zirconia products at two thicknesses

Material	Thickness, mm	TP*
<i>Lava Plus</i> (3M ESPE)	0.5	10.3 (0.2) ^a
	1.0	7.1 (0.4)
<i>NexxZr T</i> (Sagemax)	0.5	10.3 (0.2) ^a
	1.0	7.6 (0.2) ^{bc}
<i>BruxZir</i> (Glidewell Laboratories)	0.5	10.7 (0.1)
	1.0	7.8 (0.1) ^c
<i>Zenostar Zr</i> (Ivoclar Vivadent)	0.5	10.3 (0.1) ^a
	1.0	7.4 (0.1) ^b

*Means with standard deviations in parentheses. Fisher's PLSD intervals at the 0.05 level of significance for comparisons of means among products and between thicknesses were 0.2 and 0.1, respectively.

Figure 1: Differences (RD) between reflection values against white and black backgrounds at 0.5 mm thickness.

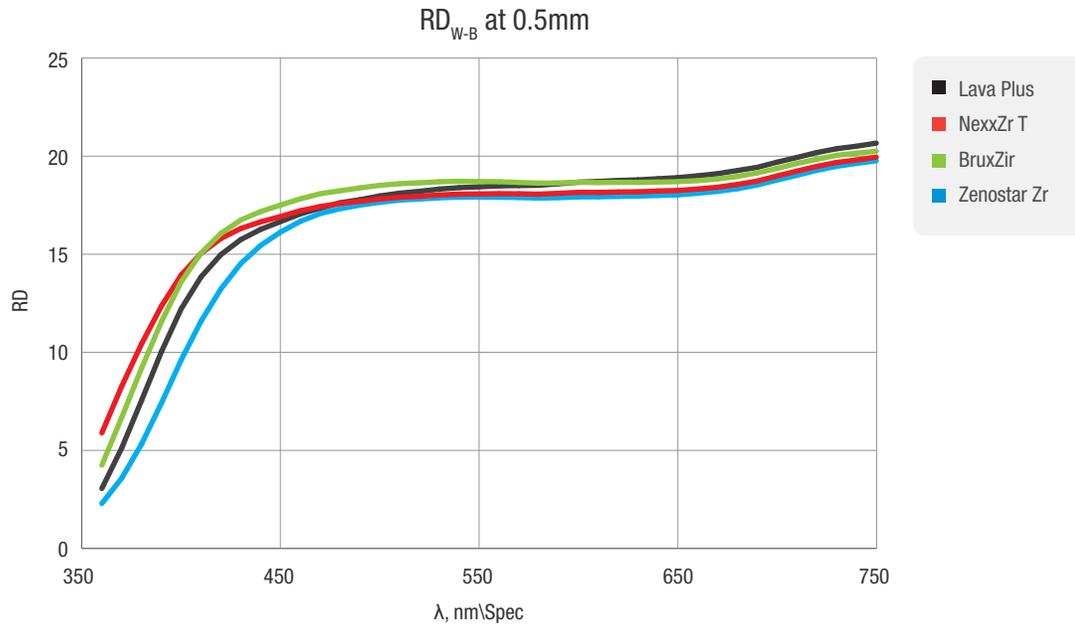
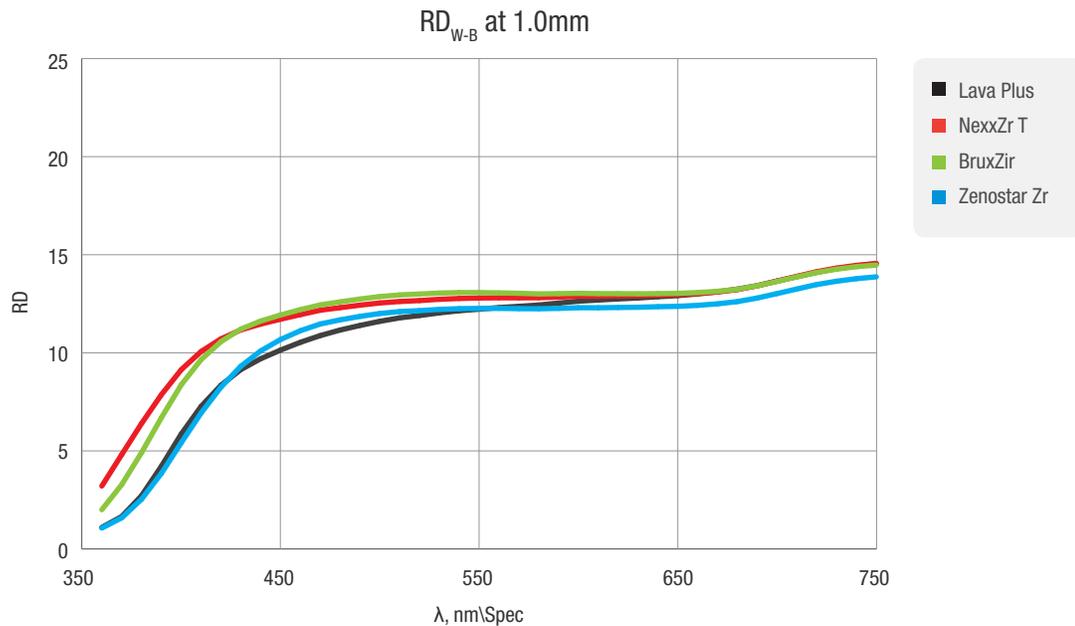


Figure 2: Differences (RD) between reflection values against white and black background at 1.0 mm thickness.



Conclusions:

Specimens of the zirconia products were more translucent at 0.5 mm thickness than at 1.0 mm thickness. At the 0.5 mm thickness, the translucency parameter ranged from 10.3 to 10.7, and *BruxZir* was significantly more translucent than the other three products. At the 1.0 mm thickness, the translucency parameter ranged from 7.1 to 7.8, and *BruxZir* was significantly more translucent than *Zenostar Zr* and *Lava Plus*. Translucency parameter was a function of wavelength when measured between 360-750 nm in reflection.