

CAD/CAM Resin-Composite Blocks: Influence of Water Sorption on Tensile Bond Strength

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INTRODUCTION & OBJECTIVES

In contrast to glass or oxide ceramics, resin-composite materials are subjected to water sorption under oral conditions. Water sorption is known to affect the mechanical properties of resin-composite materials. The aim of the present study was to investigate the influence of water sorption on the adhesion potential of novel CAD/CAM resin-composite blocks, in terms of tensile bond strength.

MATERIALS & METHODS

Tested Materials

CAD/CAM Resin-composite blocks Brilliant Crios A2 LT 14 (left, Coltène) Cerasmart A2 LT 14L (right, GC Corporation)

Water Sorption

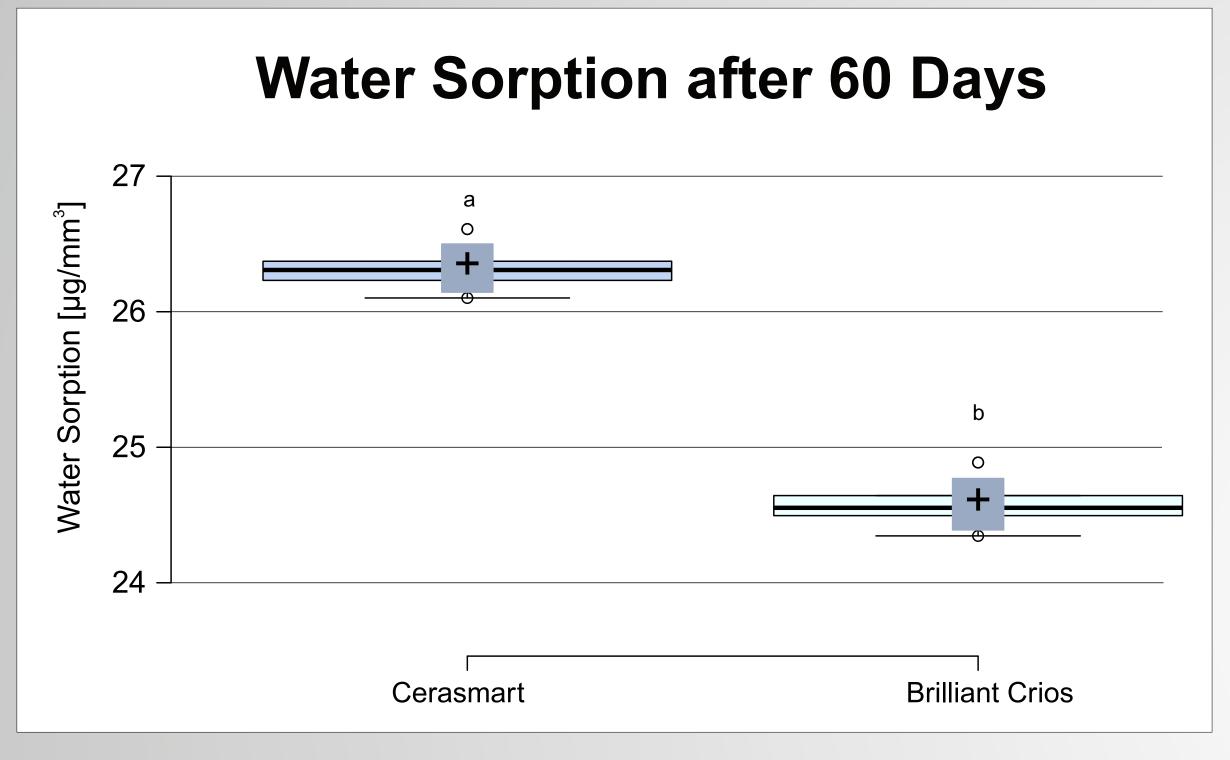
- 5 Specimens per material (12 mm in diameter and 1 mm in thickness, n=5 Brilliant Crios, n=5 Cerasmart)
- Drying until a constant weight (volume measurement)
- Specimens were subsequently stored in distilled water for 60 d at 37°C

• Water sorption was calculated as the difference in weight per volume between baseline and 60 d of storage in distilled water **Tensile Bond Strength** • 180 rectangular bars: Grit blasting Bars luted perpendicular Tensile bond strength measurement in an universal testing machine • Height 3 mm, width 3 mm, • 25 μm Al₂O₃ • 10 N pressure (crosshead speed 1 mm/min, Z 2.5, length 9 mm (h x l x w) • 1.5 bar Variolink Esthetic DC Zwick-Roell) after: Brilliant Crios (Neutral, Ivoclar Vivadent) • 15 s 24 h dry at room temperature (n=90, Coltène) Excess removal with microbrush Ultrasonic cleaning with alcohol (21°C, n=15 per material) Cerasmart • Light curing (40 s from each side at • 60 d in distilled water at 37°C Pre-treatment (n=90, GC Corporation) 800 mW/cm², Elipar Trilight, (n=15 per material) Adhese Universal

- Cupgrinder polished (Ivoclar Vivadent)
 - 20 s • Light curing (10 s, 800 mW/cm², Elipar TriLight,
- 3M ESPE)
- 45 specimens per material • 9 mm² squared bonded area
- 60 d in distilled water at 37°C and subsequent thermocycling (5000 cycles thermal loading at 5/55°C with 30 s dwell time, n=15 per material)

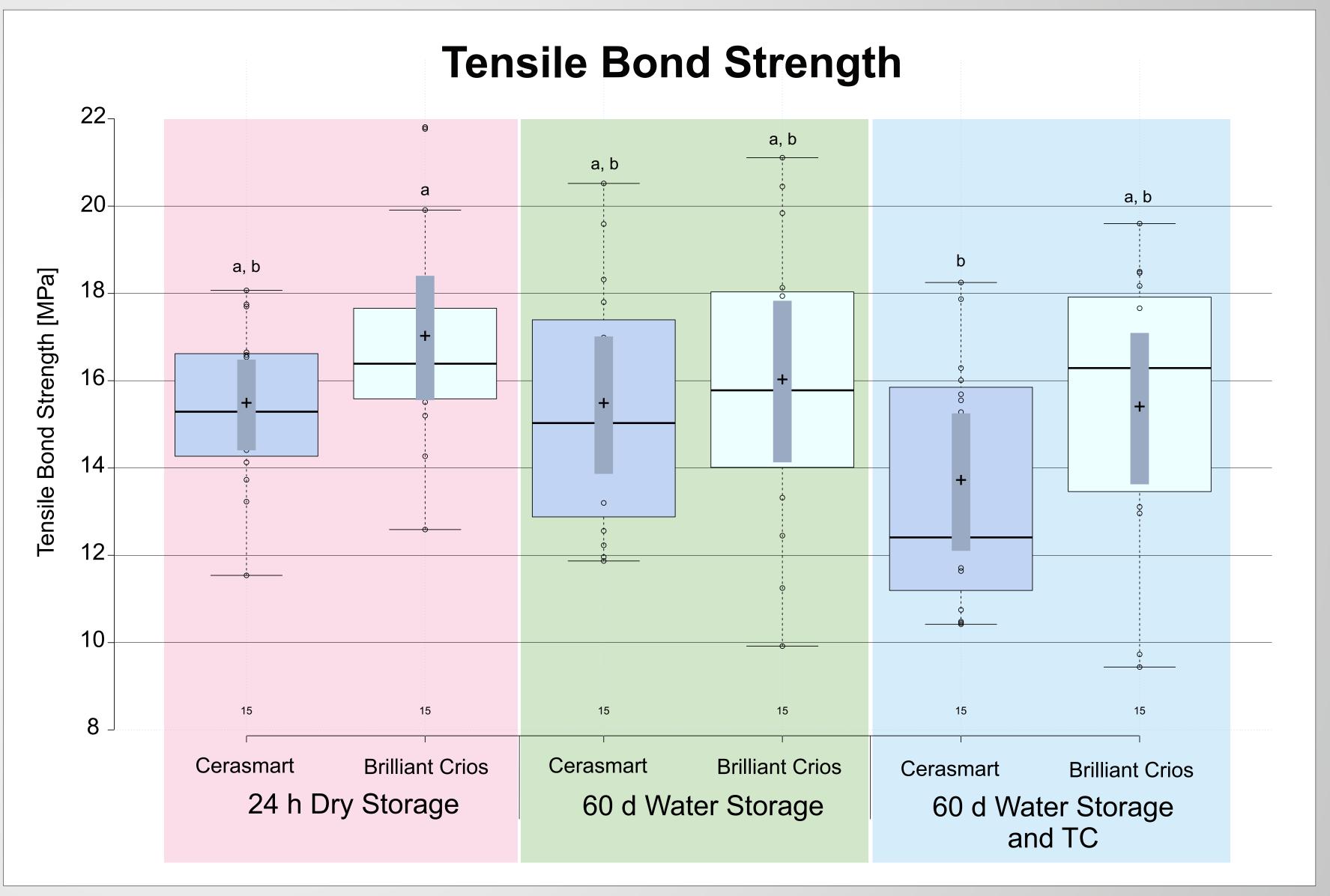
RESULTS

3M ESPE)



Boxplot of measured water sorption for all groups under investigation (top) and tensile bond strength (right). Center lines show the medians; box limits indicate the 25th and 75th percentiles as determined by R software; whiskers extend 1.5 times the interquartile range from the 25th and 75th percentiles, outliers are represented by dots; crosses represent sample means; bars indicate 95% confidence intervals of the means; width of the boxes is proportional to the square root of the sample size; data points are plotted as open circles. n = 15 sample points.

Same letters indicate homogeneous subsets (α=.05, one-way ANOVA, Student-Newman-Keuls post-hoc test).



CONCLUSION

Within the limits of the study it could be demonstrated that the extent of water sorption did not influence the adhesion potential of novel CAD/CAM resin-composite blocks.