

## **A newly-designed method to measure liner polymerization shrinkage**

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### **I. Objectives**

Newly-designed method was evaluated to measure the linear polymerization shrinkage of light-cured resin composites.

### **II. Materials and methods**

A resin composite (Clearfil AP-X, Kuraray, Japan) was filled into a vinyl-polysiloxan mold (1 to 8 mm-depth, and 7 mm-diameter). As indicators, 4 beads (Retention Beads 2 SS, GC, Japan; particle size 200  $\mu\text{m}$ ) were placed diagonally on the resin surface of a mold. The coordinates (x, y, z, position) of each indicator were measured by a measuring-microscope after which the resin surface was irradiated by a curing-light source (Optilux 500, Demetron/Kerr, USA) for 40 sec. After 20 sec the coordinates were again measured. Linear shrinkage was calculated from the coordinates measured before and after the light irradiation (n=5). For reference, linear shrinkage was evaluated also by Mercury-bath method (n=10).

### **III. Results**

Linear shrinkage was 0.63 % for the resin composite in 1 mm-depth mold, 0.67 % for 2 mm-depth, 0.69 % for 4 mm-depth, 0.60 % for 8 mm-depth respectively, and the shrinkage was 0.77 % when evaluated by Mercury-bath method. No significant difference was found in shrinkage evaluated by 2 mm-, 4 mm-depth mold and Mercury-bath method ( $p \geq 0.01$ , Tukeys).

### **IV. Conclusions**

Results of 2 or 4 mm-depth mold had a good agreement not only with the results of Mercury-bath method obtained in this study but also with previously reported shrinkage values of various resin composites. We, therefore, conclude that the newly-designed method demonstrated in this study is simple and valid to measure the linear shrinkage of resin composites.

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