μ-BioMechanics

**Specification**
All-in-One System for Measurement of Polymerization Shrinkage and Cuspal Deflection, and Computer Vision for Particle Tracking
Dimension: 45 (W) x 35 (H) x 30 (D) cm, 40 Kg
Embedded Microcontroller for Data Processing and Communication
USB connection to PC
Data Visualization (Shrinkage vs. Time) and Storage Software for Window or Mac

**Performance**
Real-Time Measurement of Polymerization Shrinkage and Cuspal Deflection
Programmable Switching of Curing Light (On-Off Time)
Measurement Range: ±500 μm
Resolution: 0.1 μm
Analysis of Shrinkage Vectors with Particle Tracking Software

**Service**
Applications
Polymerization Shrinkage Kinetics of Polymers and Composites
Measurement of Cuspal Deflection during Composite Restoration in Tooth Cavity
Analysis of Polymerization Shrinkage Vectors on Composite

Experimental Data
Polymerization Shrinkage Kinetics

Figure 1. a) The structure of the instrument for the axial shrinkage measurement. b) The geometry of the composite specimen sandwiched between two glass plates. Polymerization shrinkage creates axial (vertical) and radial (horizontal) contraction of the specimen.
Figure 2. Representative curves for polymerization shrinkage (%) and shrinkage rate (%/s) as a function of time of light cured dental composite.

References:


Cuspal Deflection Measurement

Figure 3. Configuration of the instrument for measuring cusp deflection.
Figure 4. Representative curves of cusp deflection vs. time of bulk cure, incremental cure, and indirect composite inlay.

References:


Analysis of Shrinkage Vectors with Computer Vision
Figure 5. Schematic diagram of the instrument for particle tracking with computer vision.

(a) (b)

Figure 6. Spacial domain analysis of polymerization shrinkage strain vectors on the composite surfaces. (a) Original image of fluorescent particles, (b) optical movement and shrinkage vectors, and (c) Regional shrinkage displacement (㎛) of the composite vs. time at different depths in the longitudinal section of class I tooth cavity.

References: