

Friday, March 18, 2011: 10:45 a.m. - 12:15 p.m.
Location: Room 33A (San Diego Convention Center)
Presentation Type: Oral Session

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Objectives: Evaluate polishability and gloss retention of nano filled resin-based composites (RBC) after thermocycling.

Materials and Methods: RBC: UBC-001 (UBC, A2-Enamel, Tokuyama), Filtek Supreme Plus (SP, A2E, 3M-ESPE), Esthet-X HD (EX, A2, DENTSPLY), Durafill VS (DV, A2, Heraeus Kulzer), Herculite Ultra (HU, A2, Kerr), PREMISE (PM, A2, Kerr) and Venus Diamond (VD, A2E, Heraeus Kulzer). Specimens (N=16/per group, D=10 mm, 2 mm thick) were polymerized by manufacturer's recommended times with 800 mW/cm² (Optilux 500, Kerr). Baseline gloss was measured (Novo-Curve, 2 x 2mm and 60° geometry, Rhopoint Instrumentation) before grinding with P800 SiC paper (22 µm). They were then successively polished by two methods: ["clinical"] Sof-Lex fine (24µm) and super-fine (8µm) discs, or ["laboratory"] P2400 (8µm), P4000 SiC papers (5µm), 1µm, 0.25µm, 0.1µm diamond suspensions. Each specimen was then thermocycled between 5 °C and 55 °C up to 50,000 cycles. Polishability and gloss retention was measured (N = 3/per specimen) before and after each polishing and thermocycling step, then the average of three measurements was used for statistical analysis. One-way ANOVA and repeated measures ANOVA with appropriate post-hoc test were conducted to assess the effect of composites on the polishability and gloss retention, within and across each polishing and thermocycling step, respectively (alpha=0.05).

Results: Laboratory polishing produced a higher gloss than the clinical polishing method. UBC had a significantly higher gloss than other RBCs with "clinical" polishing. Results for "laboratory" polishing after thermocycling are shown below due to non-significantly different baseline RBC gloss (except for DV).

Conclusion:

1. UBC had a significantly higher gloss under simulated clinical polish.
2. Polishability and gloss retention varies by polishing method.
3. Nanofills, UBC and SP, had significantly higher laboratory polish gloss retention beyond 30k thermocycles.

Acknowledgements: Supported by Tokuyama Dental Corporation. Hirata and Yamagawa were employees of Tokuyama while a visiting scientists at University of Iowa.

RBC	Laboratory polishing: Mean gloss units (SD) after thermocycling (TC)					
	0 TC	3k TC	10k TC	20k TC	30k TC	50k TC
SP	94.29 (1.24) ^{A,1}	93.23 (1.49) ^{B,2}	92.53 (1.25) ^{A,2}	90.95 (0.99) ^{A,3,4}	90.45 (1.32) ^{A,4}	91.48 (0.83) ^{A,3}
DV	75.88 (3.15) ^{B,1}	75.54 (2.72) ^{C,1}	73.86 (2.73) ^{B,1}	71.03 (2.18) ^{C,2}	67.20 (2.19) ^{C,3}	65.41 (2.55) ^{C,3}
EX	95.14 (0.73) ^{A,1}	93.73 (0.65) ^{B,2}	92.01 (1.34) ^{A,3}	89.92 (1.02) ^{A,B,4}	86.75 (1.45) ^{B,5}	85.01 (2.05) ^{B,6}
HU	94.58 (0.70) ^{A,1}	93.55 (0.77) ^{B,2}	93.09 (0.90) ^{A,2}	88.70 (0.55) ^{B,3}	87.65 (0.54) ^{B,4}	84.88 (1.56) ^{B,5}
UBC-001	94.48 (0.51) ^{A,1}	94.48 (0.57) ^{A,1}	92.87 (0.79) ^{A,2}	91.09 (0.88) ^{A,3}	90.95 (0.69) ^{A,3}	91.11 (0.76) ^{A,3}

Column means with the same letter are not significantly different using post-hoc Tukey-Kramer's test, and *Bonferroni*'t-test ($P > .05$). Row means with the same number are not significantly different using post-hoc Tukey-Kramer's test, and *Bonferroni* t-test ($P > .05$). PM and VD evaluated only by "clinical" polishing.

Keywords: Color, Composites, Dental materials, Polymers and Surfaces

Presenting author's disclosure statement: Study sponsored by Tokuyama Dental Corporation. Tokuyama dental products are evaluated and reported on within this paper.

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