

Comparison of Important Properties of Ecosite Elements and Competitive Materials

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Experimental Design:

Materials:

Ecosite Elements (DMG), **Tetric EvoCeram** (Ivoclar Vivadent, Inc.), **Filtek Supreme Ultra Universal Restorative** (3M Oral Care), **Estelite Sigma Quick** (Tokuyama)

Suggested Tests:

Micro-Vickers Hardness, n=5: 2 mm thick by 10 mm diameter discs will be cured in a mold covered by a Mylar sheet before being stored for 24 h in 37°C water. They will be tested using a HMV-G21D Micro Hardness Tester (Shimadzu) typically using a 100-200 gf load and 10 second dwell time with 3 indentations per specimen. Indentation dimensions and hardness values will be calculated utilizing the HMV Pattern Test software. Mean values and standard deviations will be reported.

- Ecosite Elements – Layer
- Filtek Supreme Ultra Universal Restorative
- Tetric EvoCeram
- Estelite Sigma Quick

Cost: \$4,000 plus composite (1 syringe of composite)

ISO 29022 Edge-Notched Shear Bond Strength to Dentin, Enamel at 24h (n=8, N=128): Human, adult, extracted third molars, sterilized in a 1% chloramine T solution, will be embedded in acrylic resin discs and ground through 600-grit SiC paper to form bonding substrates of superficial dentin or enamel. Specimens will then be ultrasonically cleaned in deionized water for 5 minutes and the surfaces prepared with etching and/or adhesive. Composite will then be placed on top of the substrate utilizing the Ultradent Shear Test mold and jig to produce a 2.38 mm diameter shear test cylinder according to ISO 29022:2013. The cylinder will be light cured in accordance with the manufacturer's instructions while in the mold. The specimens will then be transferred to a 37°C deionized water bath for 24 hours until testing. Testing will be performed using an Instron 5866 at a crosshead speed of 1 mm/min and shear bond strength results given with means and standard deviations and failure mode analyzed using a 45X light microscope.

Test Groups to dentin and enamel:

- Ecosite Elements – Pure + Ecosite Bond (self-etch, light-cured)
- Ecosite Elements – Pure + Ecosite Bond (total-etch, light-cured)
- Filtek Supreme Ultra Universal Restorative + Scotchbond Universal (self-etch, light-cured)
- Filtek Supreme Ultra Universal Restorative + Scotchbond Universal (total-etch, light-cured)
- Tetric EvoCeram + Adhese Universal (self-etch, light-cured)
- Tetric EvoCeram + Adhese Universal (total-etch, light-cured)
- Estelite Sigma Quick + Tokuyama Bond Force (self-etch, light-cured)
- Estelite Sigma Quick + Tokuyama Bond Force (total-etch, light-cured)

Cost: \$21,000

Polishing and Specimen Preparation: The composites (n=3 per time point, N=12 for 4 time points) will be cured in a mold (10 mm in diameter, 2-mm thick) with a Mylar strip according to manufacturer instructions. The specimens will be uniformly finished with 600 grit SiC paper. The specimens will be polished for 15, 30, 45, 60 seconds according to manufacturer's instructions while held in a flexible silicone mold.

Gloss: The gloss will be measured over a 2 mm x 2 mm area using a small area glossmeter at 60° (Novo-Curve, Rhopoint Instruments), with 3 measurements taken every 120° of orientation per time point. Mean values and standard deviations of gloss will be determined at each time point to generate a time dependent gloss curve.

Surface Roughness and 3D topography: Surface roughness can be measured using an atomic force microscope (Veeco Dimensional Icon) with 3 measurements taken per surface. Mean surface roughness with standard deviations will be reported. An average surface roughness (Ra) below 0.2 is desired to minimize bacterial retention. A curve can be generated to show surface roughness and gloss over time and representative 3D images of surface topography compared.

- Ecosite Elements – Layer
- Ecosite Elements – Pure
- Filtek Supreme Ultra Universal Restorative
- Tetric EvoCeram
- Estelite Sigma Quick

Cost for 4 time points:

Polishing, Surface Roughness and 3D Topography: **\$15,000** *plus materials (2 syringes of composite)*

Total Cost:

\$47,500.⁰⁰

Deliverable:

Results of testing and data will be provided in a Research Report. Reports will be published on our website and in a future print issue. This also includes an unprotected, printable report and the ability to use any copyrighted statements and graphs, charts and photos.

Accepted:

Matt Cowen

DENTAL ADVISOR

DMG