Department of Operative Dentistry

https://www.dentistry.uiowa.edu/operative

Prepared By:
Dr. Erica Teixeira
Dr. Marcos Vargas
Dr. Steve Armstrong

801 Newton Rd, Iowa City, IA 52242
Phone: 319-3357270 E-Mail: Erica-teixeira@uiowa.edu

Materials tested

Four composite materials were evaluated for this report as shown below:

Material	Shade	Type	Lot number	Manufacturer
Ecosite Bulk Fill	Universal		777198	DMG
Filtek One Bulk Restorative	A2	Bulk-Fill Nano-filled	N868903	3M
SonicFill 2	A2	Bulk-Fill Nano-hybrid	6591015	Kerr
Tetric EvoCeram Bulk Fill	IVA	Bulk-Fill Nano-hybrid	W91102	Ivoclar Vivadent

Light Transmission

Depth	Ecosite Bulk	SonicFill2	FiltekOne	Tetric Evoceram Bulk
2mm	29.1%	12.0%	15.9%	23.9%
4mm	9.1%	0.0%	0.0%	6.9%

Ecosite Bulk Fill showed the highest percentage for light transmission when compared to the other composite materials.

Depth of Cure

Depth of Cure was determined by Knoop microhardness measurements of the top and bottom surface. Two indentations were performed on each surface, under a 100gf load for 15s. The average of the two was used to calculate the microhardness. Specimens used for the light transmission were used for the measurement of the microhardness. The resulting KHN values were used to

estimate the percentage of hardness compared to the top. The values of all materials varied between 62% and 85% for the depth of cure measured by microhardness.

DOC	Ecosite Bulk	FiltekOne	SonicFill2	Tetric Evoceram Bulk
2mm	69%	71%	77%	79%
4mm	75%	76%	85%	62%

The overall hardness for 4mm (top) samples were 55KHN (Knoop value) for Ecosite Bulk, 51.2KHN for FiltekOne, 53.1 for SonicFill, and 52.4 for Tetric Evoceram.

Depth of Cure- Solvent Resistance

	mm	SD	CV
Ecosite BulkFill	11.06	0.54	4.87
SonicFill 2	7.25	0.18	2.46
Filtek One Bulk	9.19	0.13	1.46
Tetric Evoceram	9.30	0.15	1.56

Ecosite Bulk Fill showed the highest depth of cure when compared to the other composite materials measured by solvent resistance.

Roughness and Gloss

A stainless steel mold was used to fabricate the specimens with an average thickness of approximately 1.2mm thickness. Specimens were cured for 40s (at 1,000mW/Cm^2). Samples were polished after 48 hours in storage. Samples were polished with silicon paper 600 and 800 grit, followed by polishing using Kerr rubber points (blue and grey) under water spray. Samples were cleaned and dried before measurement was performed.

Average Gloss units for unpolished composite averaged 90 units for all composites. Gloss units were similar for most groups, with SonicFill 2 being the lowest of the composite tested.

Material (n=6)	Average Gloss Units(SD)
Ecosite Bulk Fill	67.0 (5.4)
Filtek One Bulk Fill	72.4 (8.0)
Sonic Fill2	46.9 (6.1)
Tetric EvoCeram Bulk Fill	62.8 (4.4)

Roughness values are displayed in nm. Ecosite BulkFill showed the lowest roughness values among the composites tested. The other groups presented a higher Ra value. Roughness was measured using a 3-D Optic Profiling System (WYKO NT 1100-VEECO) under vertical shift interference. Two measurements were performed on each specimen.

Material (n=6)	Average Roughness in nm (SD)
Ecosite Bulk Fill	67.2 (11.5)
Filtek One Bulk Fill	162.3 (37.3)
Sonic Fill2	165.9 (76.2)
Tetric EvoCeram Bulk Fill	187.31 (19.1)

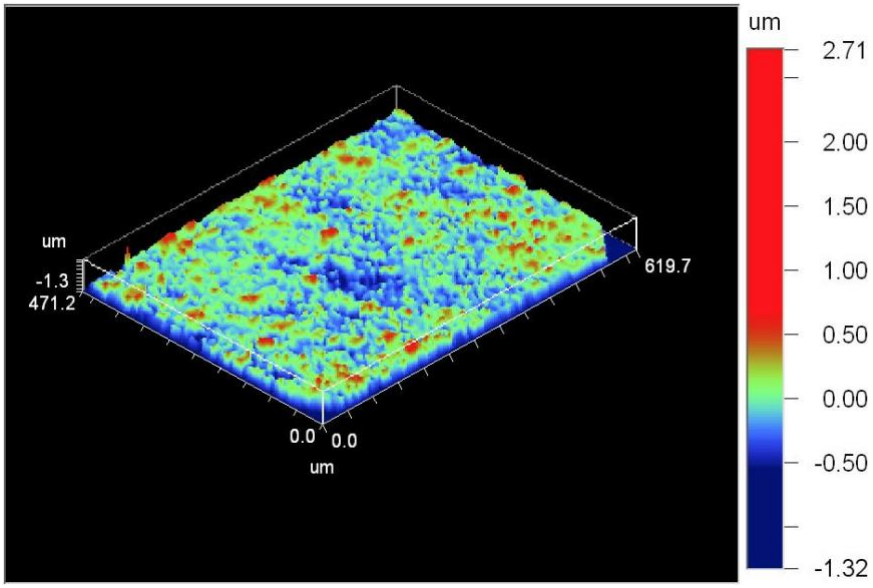
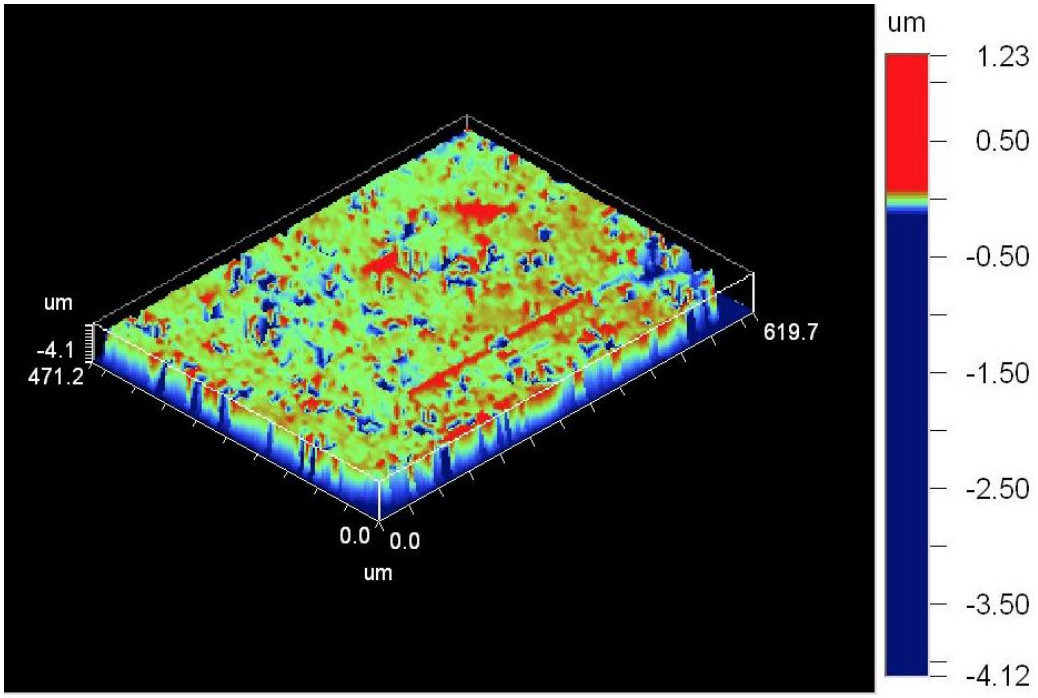


Figure 1- 3D image



of SonicFill2 (Ra=181 nm)

Figure 2--3D image of Ecosite Bulk Fill surface (Ra=69.2 nm)

Micro CT Scan-Marginal Adaption

Class II preparations were performed in molars and the teeth were restored with the four composite materials tested. The teeth were scanned with a Xradia Versa 3D XRM-520, Zeiss, Germany. The x-ray settings were as follows: voltage (kV): 140, power (watts): 8, rotation: 360, projections: 1601, exposure time (seconds): 1.25, objective: 0.4x, reconstructed pixel size: 25 microns.

Differences in density of the material were observed, with materials showing proper marginal adaptation, based on qualitative observation.(see images)

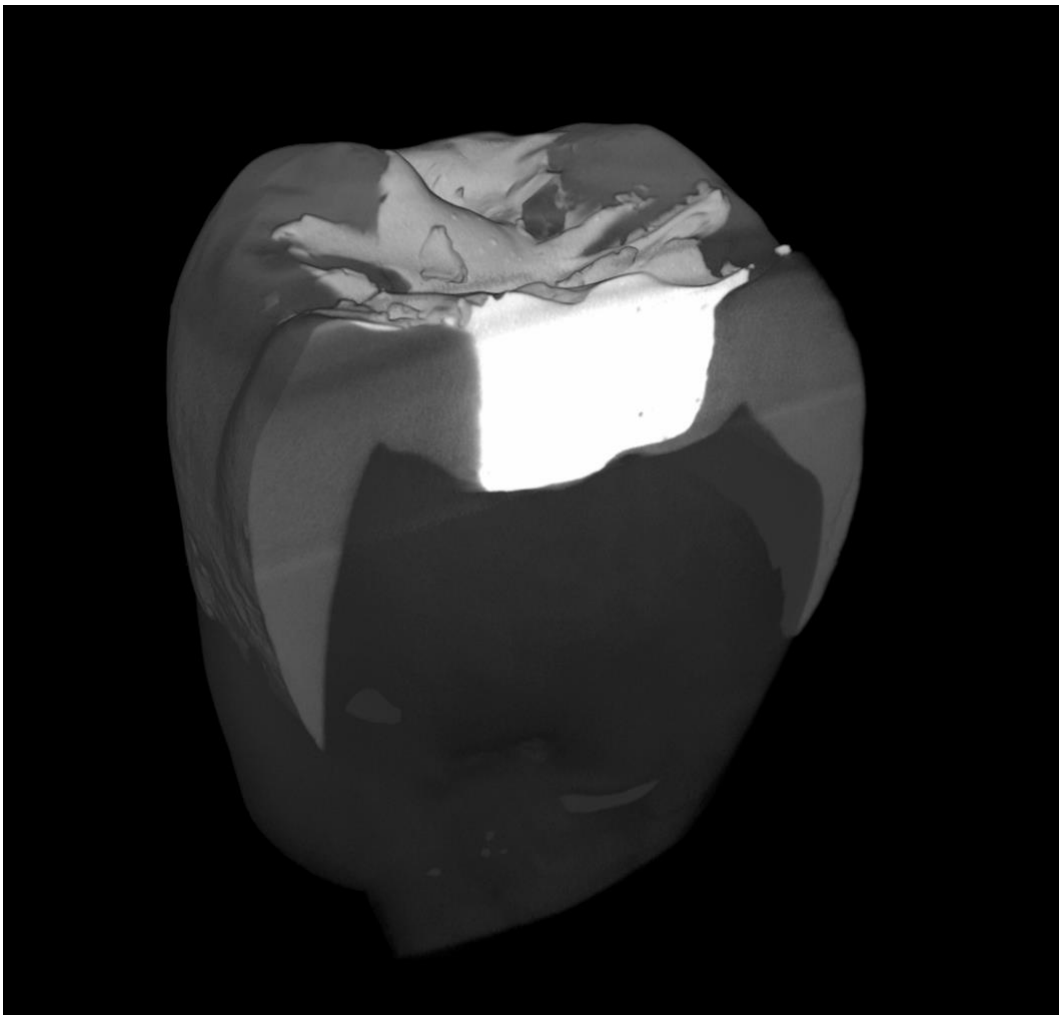


Figure 2-Ecosite Bulk Fill Cross Sectional Image

Figure 3-Ecosite BulkFill MOD restoration

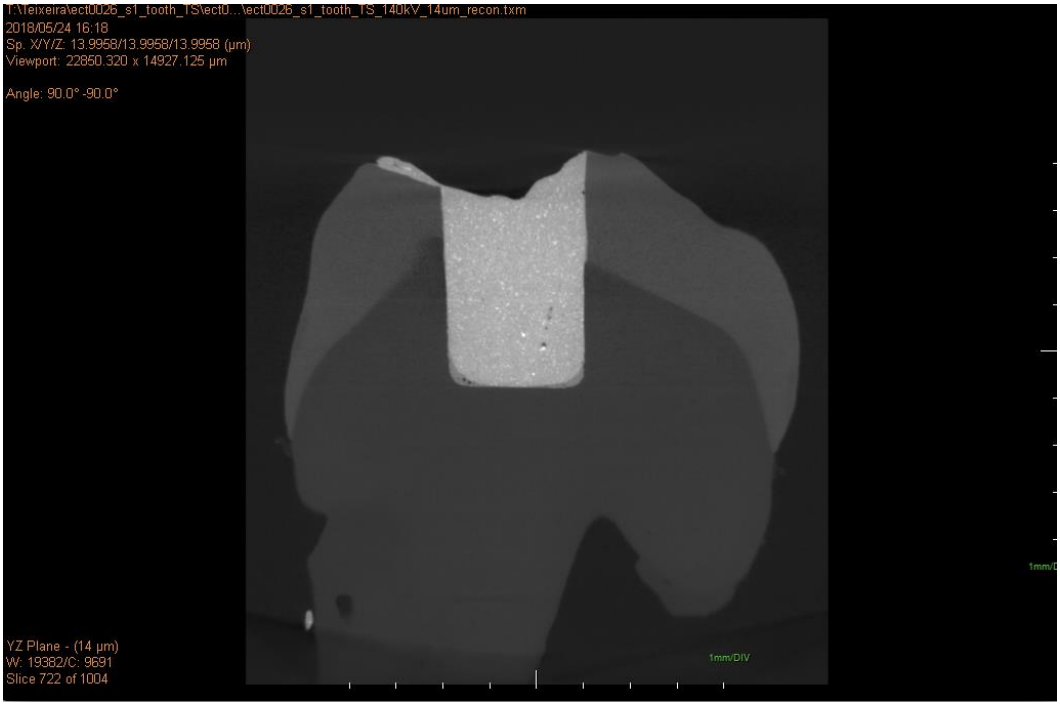


Figure 4- Tetric EVoCeram Bulk Fill

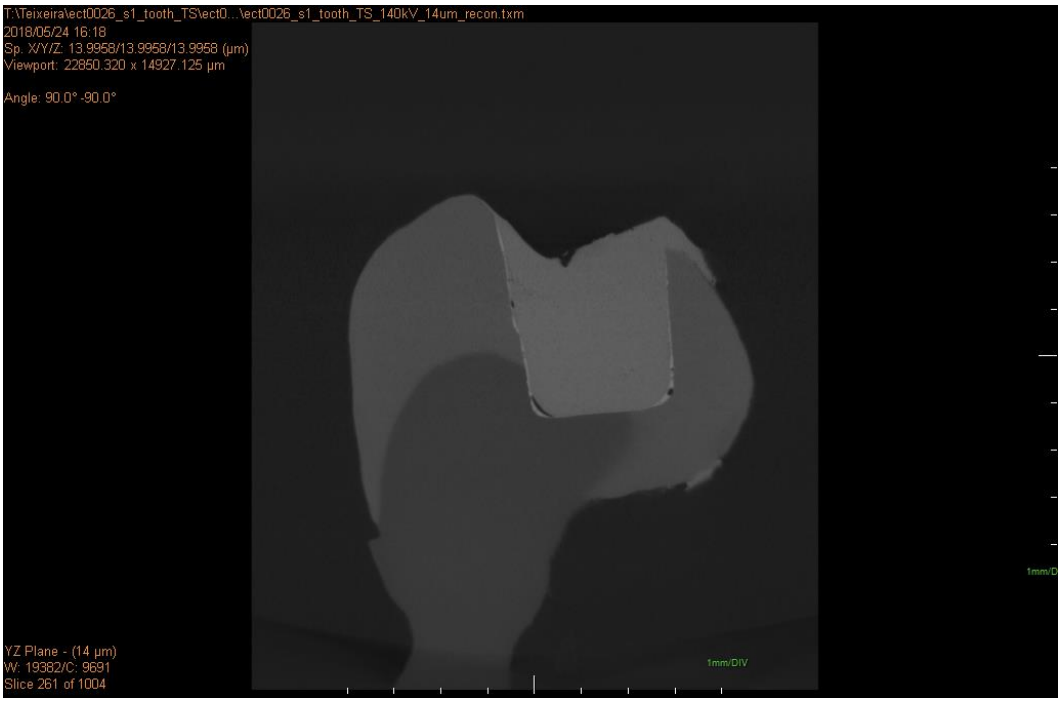


Figure 5-Sonic Fill2

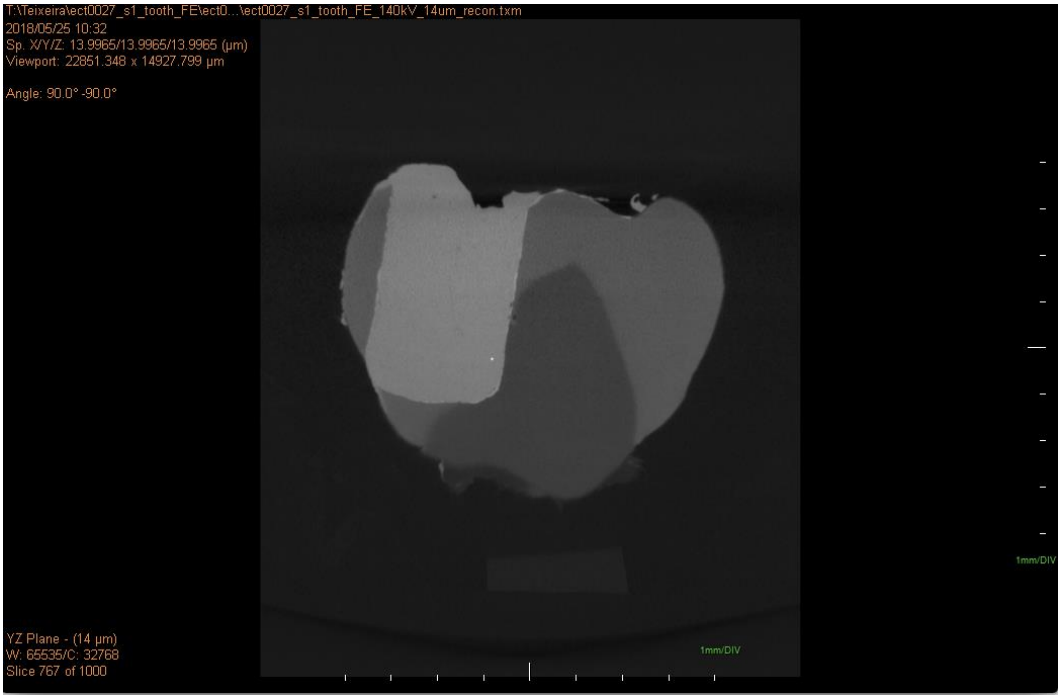


Figure 6-Filtek One Restorative