

**EFFECT OF SURFACE TREATMENTS ON PREPARED SHORT
FIBER-REINFORCED RESIN COMPOSITE
TO SHEAR BOND STRENGTH AND BOND DURABILITY
WHEN USING RESIN CEMENT**

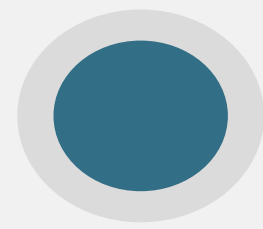
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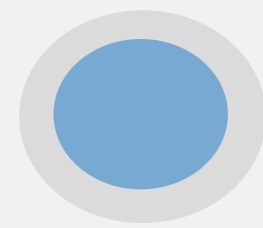


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What is the problem?



A newly recommended method for restoring large cavities is the biomimetic approach of using short fiber reinforce resin composite (SFRC) as dentine-replacing material. SFRCs have



The short fiber-reinforced resin composite (SFRCs) has been used as core build up in severely damaged teeth, presented in high loading capacity and restorative failure. However, SFRCs were presented the denuded fiber exposure and no oxygen inhibited layer after tooth preparation process of indirect restoration, that might inhibit adhesion to resin cement.

Conclusion

There's no evidence about SFRCs bonding capacity to resin cement after tooth preparation.

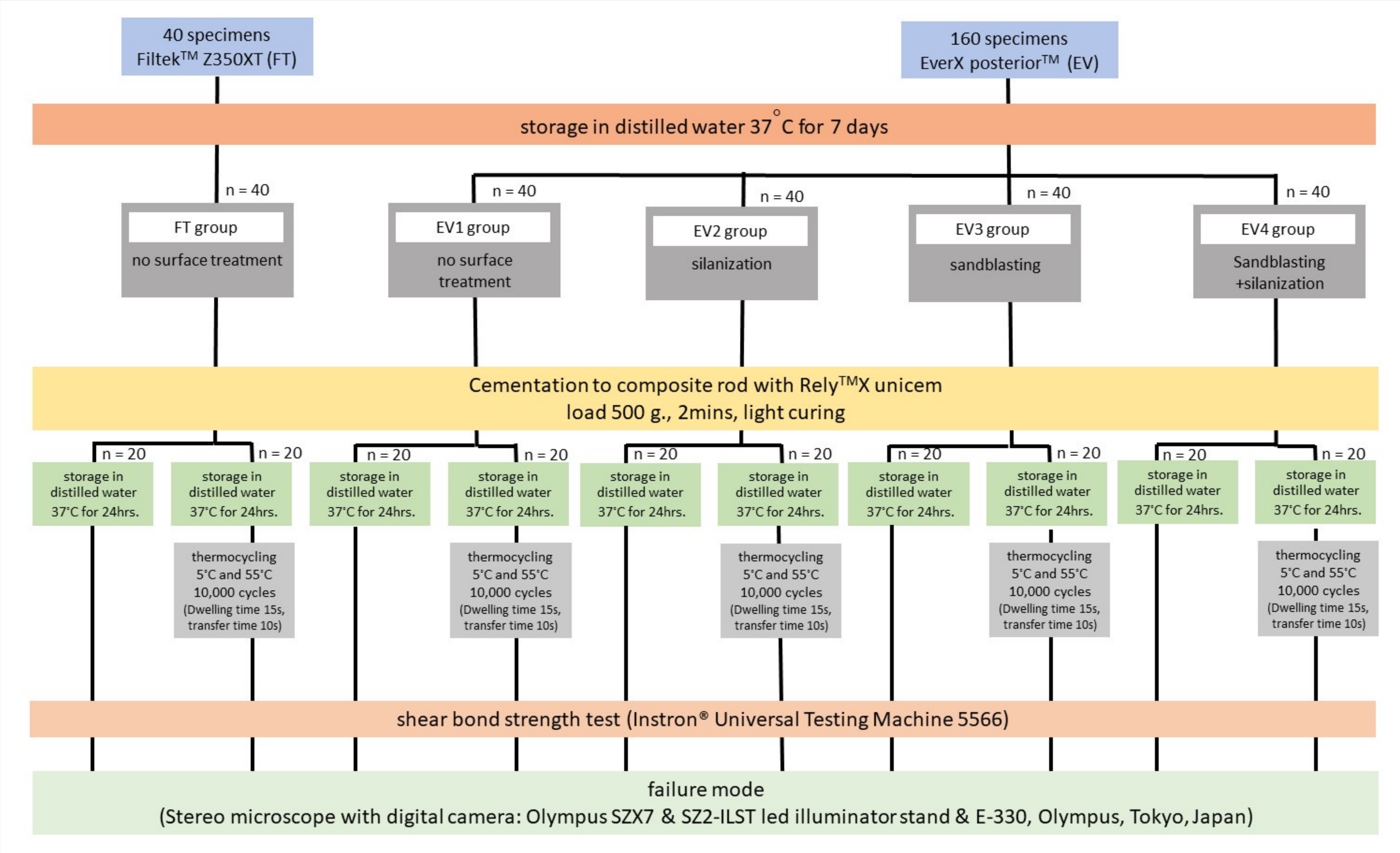
The aim of this study



To evaluate effect of surface treatment on prepared short fiber-reinforced resin composite to shear bond strength and bond durability when using self-adhesive resin cement.

Materials and Methods

Diagram of manipulation methods of each experimental group



Shear bond strength analysis :

- Two-way ANOVA (p<0.05)
- Multiple comparisons : Tukey's test

Failure mode :

- descriptive analysis

*Silanization : apply Rely™Xceramic primer onto EV2 specimens with microbrush 60 second and air dry.

**Sandblasting : 50 μm. Aluminum Oxide, 15 s, 2.5 bar, 10 mm. distance and clean with air-water spray from triple syringe for 1 minutes and air-dry.

Shear bond strength to self-adhesive resin cement

Groups		Shear bond strength (MPa)	
		24-hours bond	Thermocycling 10,000 cycles
Filtek™Z350XT + no treatment	FT	13.85 ± 3.12 ^B	8.22 ± 2.52 ^A
EverX posterior™ + no treatment	EV1	26.57 ± 2.28 ^{DE}	19.52 ± 3.81 ^C
EverX posterior™ + Silanization	EV2	27.42 ± 3.45 ^{DEF}	24.23 ± 4.78 ^D
EverX posterior™ + sandblasting	EV3	30.85 ± 3.36 ^F	24.68 ± 4.30 ^D
EverX posterior™ + sandblasting + silanization	EV4	29.95 ± 3.35 ^{EF}	25.86 ± 3.33 ^D

Different superscript letters indicate statistical differences. ($p < 0.05$)

The FT group presented the lowest mean SBS while the EV4 group presented the highest mean SBS. According to Two-way ANOVA, there were statistically significant difference ($p < 0.05$) between FT group and all EV groups, both before and after thermocycling.

The SBS at 24-hours bond of different surface treatment methods of all EV groups was no statistically significant difference ($p < 0.05$) except between EV1 group and EV3 group.

Results

The surface morphology

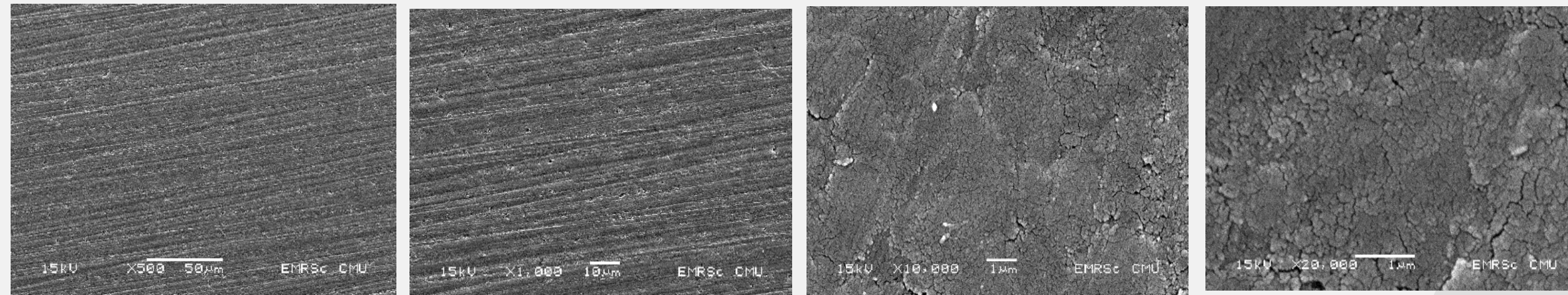
The surface morphology of different surface treatment methods showed different characteristics.

The FT group presented the homogenous nanofiller particles.

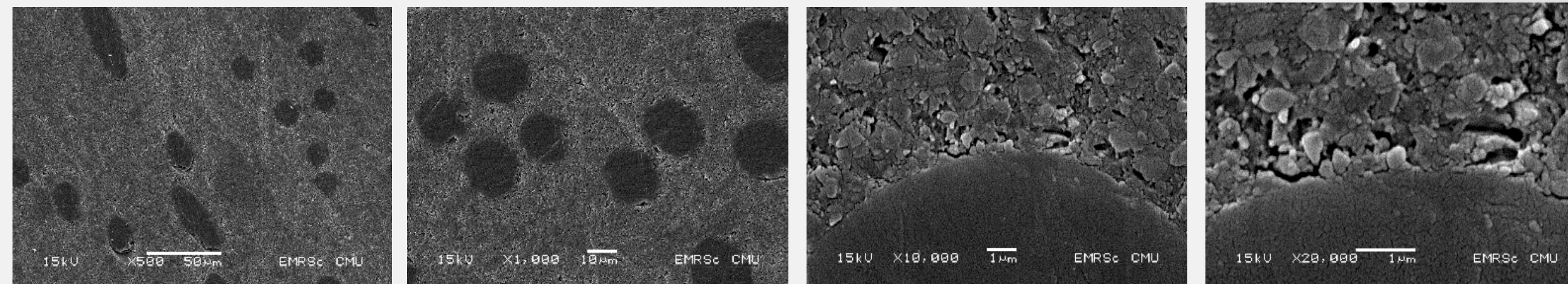
The EV1 and EV2 groups were presented in 2 parts, the composite, and the fibers. The composite part showed mixed sized filler and the fibers part present in cylinder and ellipse shape in difference size and randomly direction.

The EV3 and EV4 showed irregular surface and black holes at the fiber area.

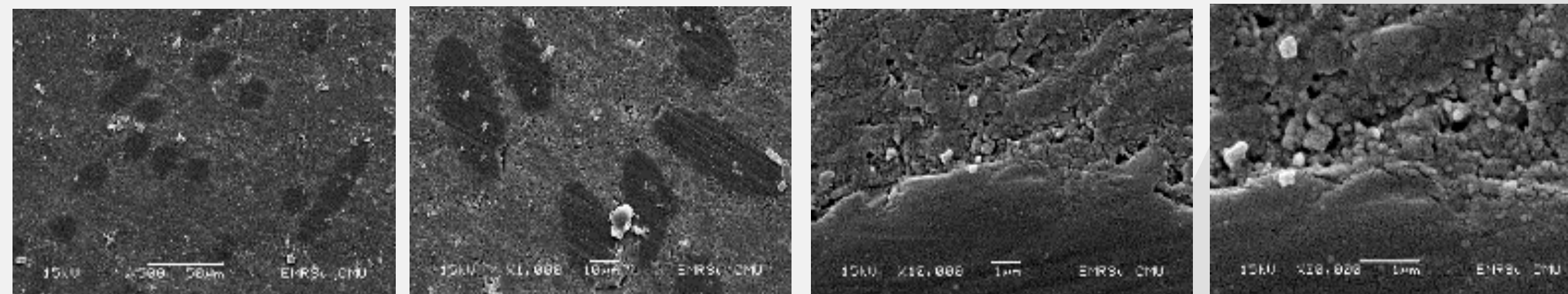
FT group



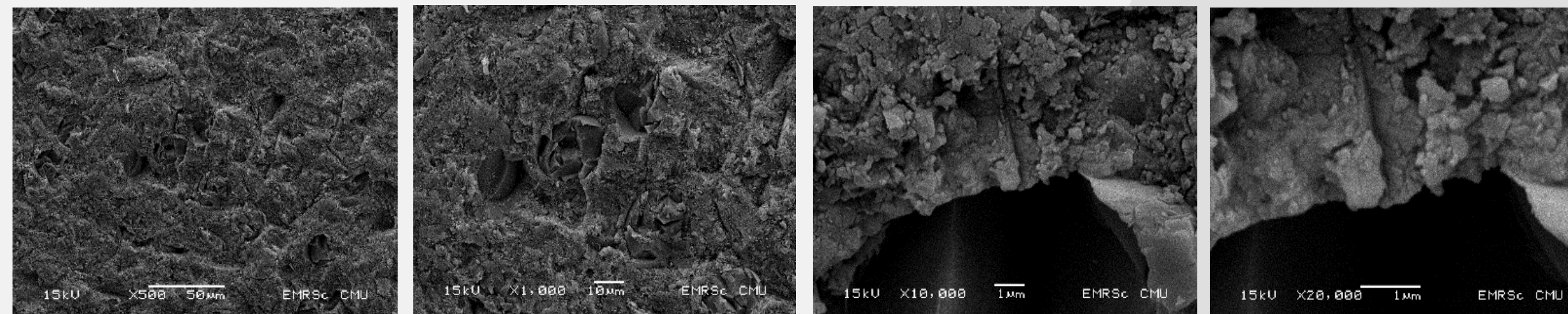
EV1 group



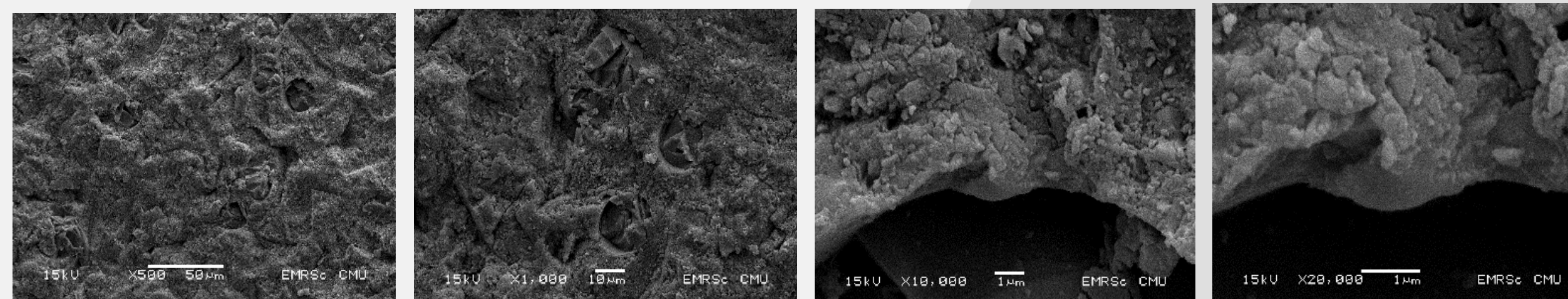
EV2 group



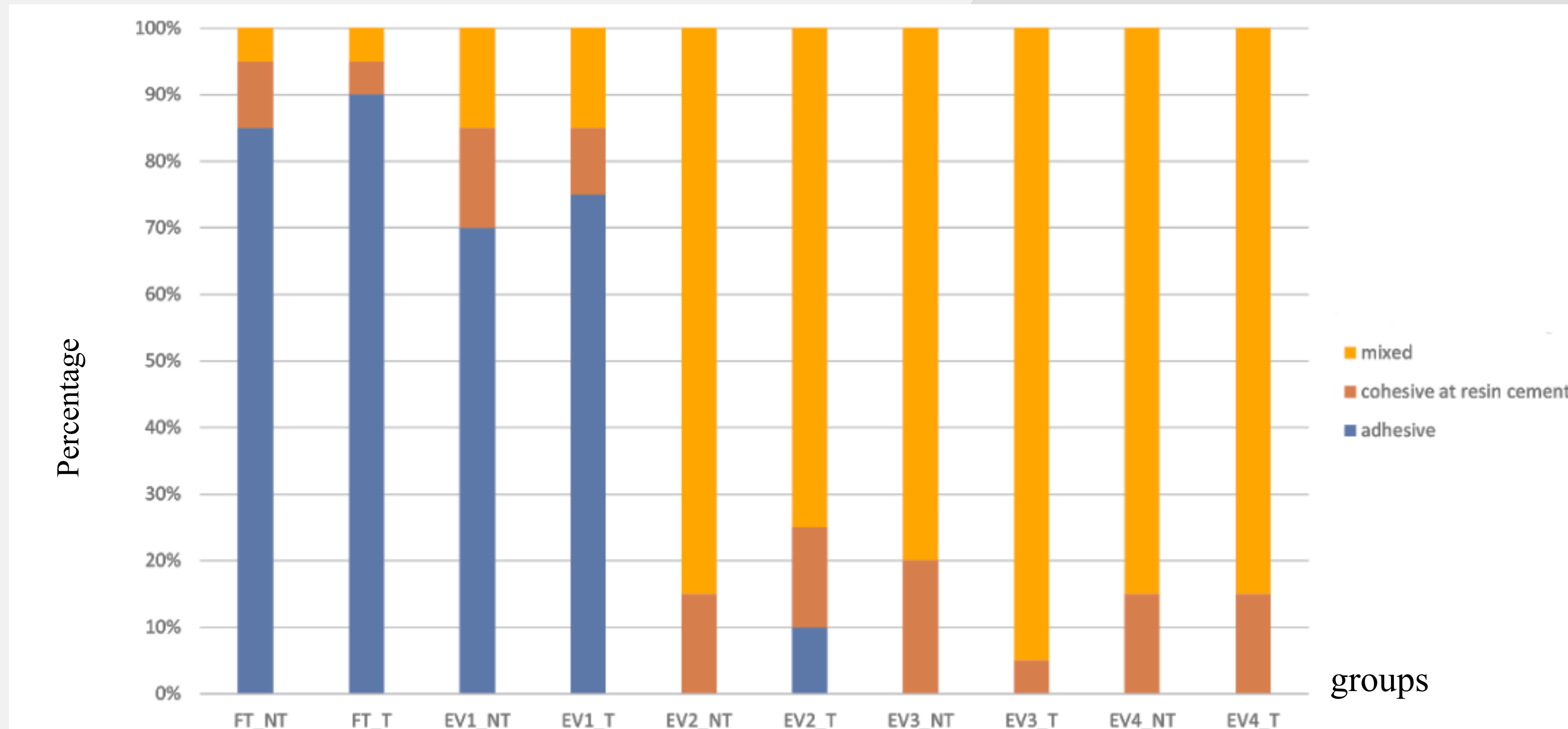
EV3 group



EV4 group



Mode of failure



*FT_NT : FT group & Non-thermocycling, FT_T : FT group & Thermocycling, EV1_NT : EV1 group & Non-thermocycling, EV1_T : EV1 group & Thermocycling, EV2_NT : EV2 group & Non-thermocycling, EV2_T : EV2 group & Thermocycling, EV3_NT : EV3 group & Non-thermocycling, EV3_T : EV3 group & Thermocycling, EV4_NT : EV4 group & Non-thermocycling, and EV4_T : EV4 group & Thermocycling

Mode of failure analysis showed predominantly adhesive failure in FT and EV1 and mixed failure in EV2 and EV3 and EV4, both before and after thermocycling.

Conclusions:

Base on this study,



The SFRCs present higher SBS than conventional resin composite.



All of surface treatments of SFRCs were effective to increasing SBS between the SFRCs to self-adhesive resin cement.



The SBS of SFRCs to resin cement was decreased with statistically significant difference ($p < 0.05$) after thermocycling in all group of specimens except silanization group (EV2), so the silanization group present highest bond durability.

Further study

This study was a laboratory experimental that stimulated the clinical timing (7days) for waiting the final restoration



Included the
temporary cement
factor



Clinical trial

Contact

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