Regional catch-up session 1 – Cairo, Egypt

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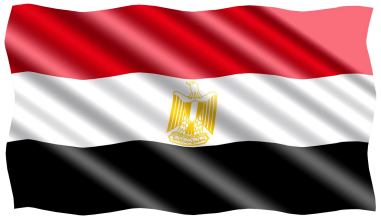
Dr. Hadiel Zamzam, National Research Center

Dr. Maha Mostafa, Ain-Shams University

Dr. Eman El-belasy, Mansoura University

Cairo, Egypt



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(222) This is Egypt - YouTube

Interfacial integrity of bulk-fill resin composite restorations in deep Class-II cavities.

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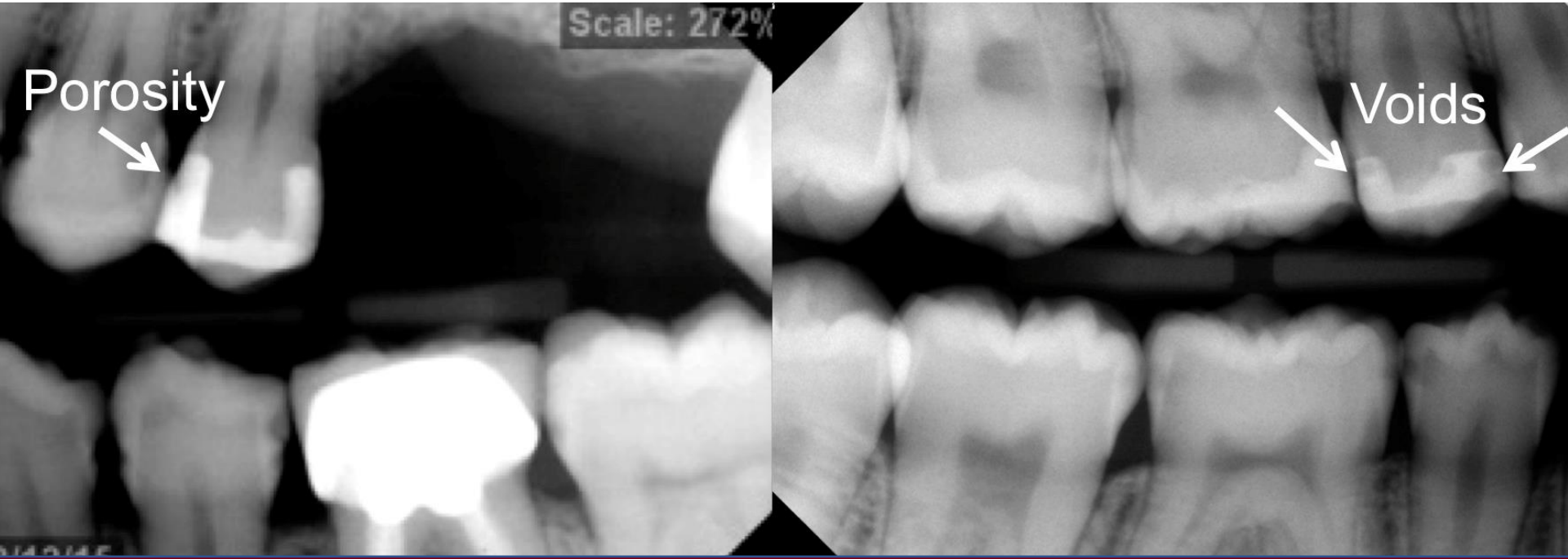
Disclosure:

- All the work was done at MDRCBB labs, University of Minnesota, USA.
- 3M, St Paul, USA provided the materials used in this study.
- 3Mgives sponsored my study at the University of Minnesota, USA through the Key Opinion Leaders (KOLs) program

Drawbacks of Incremental techniques

Drawbacks of Incremental techniques



Courtesy of 3M ESPE

CONSIDERATIONS

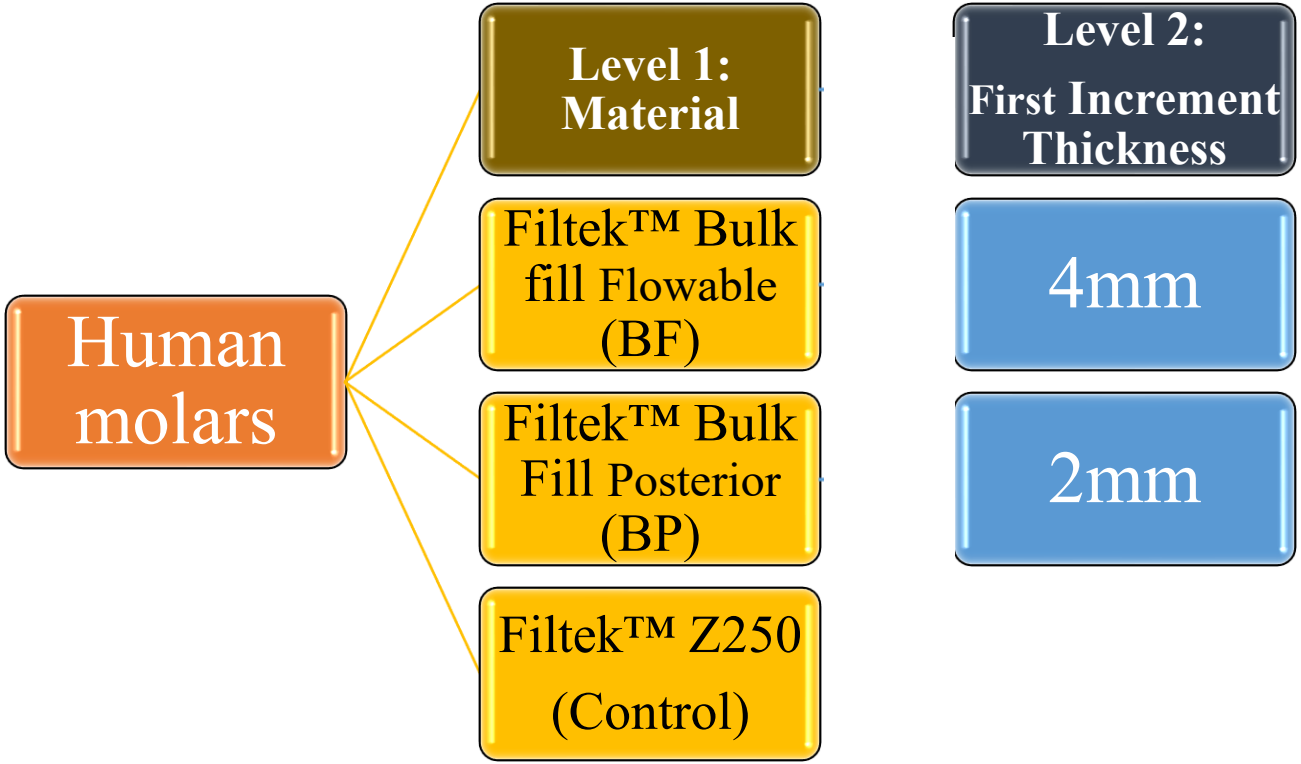
Will it work?
No high stresses?
No debonding?
Will it cure well in deep cavities (less light+ bulk of material)?
Is there a preferred technique?

AIM:

Assess the interfacial integrity of deep (6 mm) MO/OD Class-II restorations placed using bulk-fill resin composites of different filler volume and different incremental thicknesses.

Materials and Methods

Experimental design

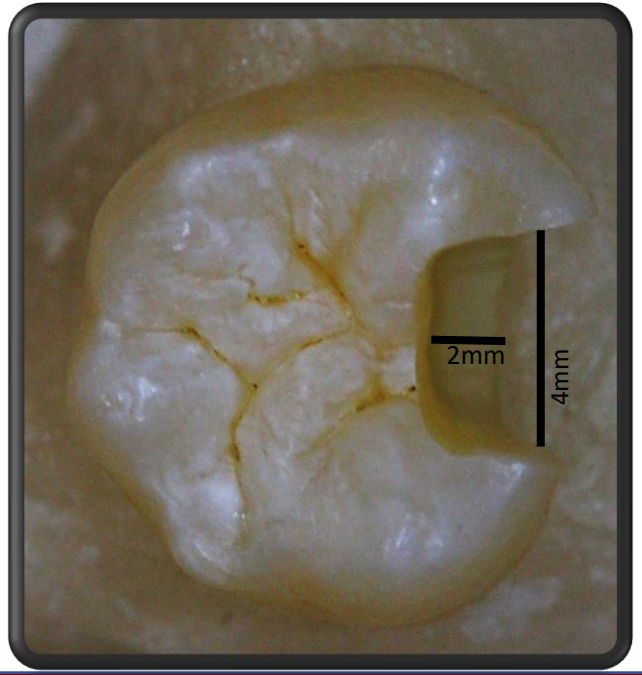


Filtek™ Bulk Fill Flowable, 3M ESPE

Filtek™ Bulk Fill Posterior RESTORATIVE, 3M ESPE

Specimen preparation:

- Proximal cavities of 6mm (depth) x 4mm (bucco-lingual width) x 2mm (mesio-distal width) were prepared.



Restorative Procedure:

1. Etch dentin/enamel with Kerr Gel Etchant* (37.5% phosphoric acid) for 15 seconds.

2. Rinse thoroughly for 15 seconds.

3. Air dry for 3 seconds. Do not desiccate.

4. Apply PRIME** with light brushing motion for 15 seconds.

5. Air dry for 5 seconds.

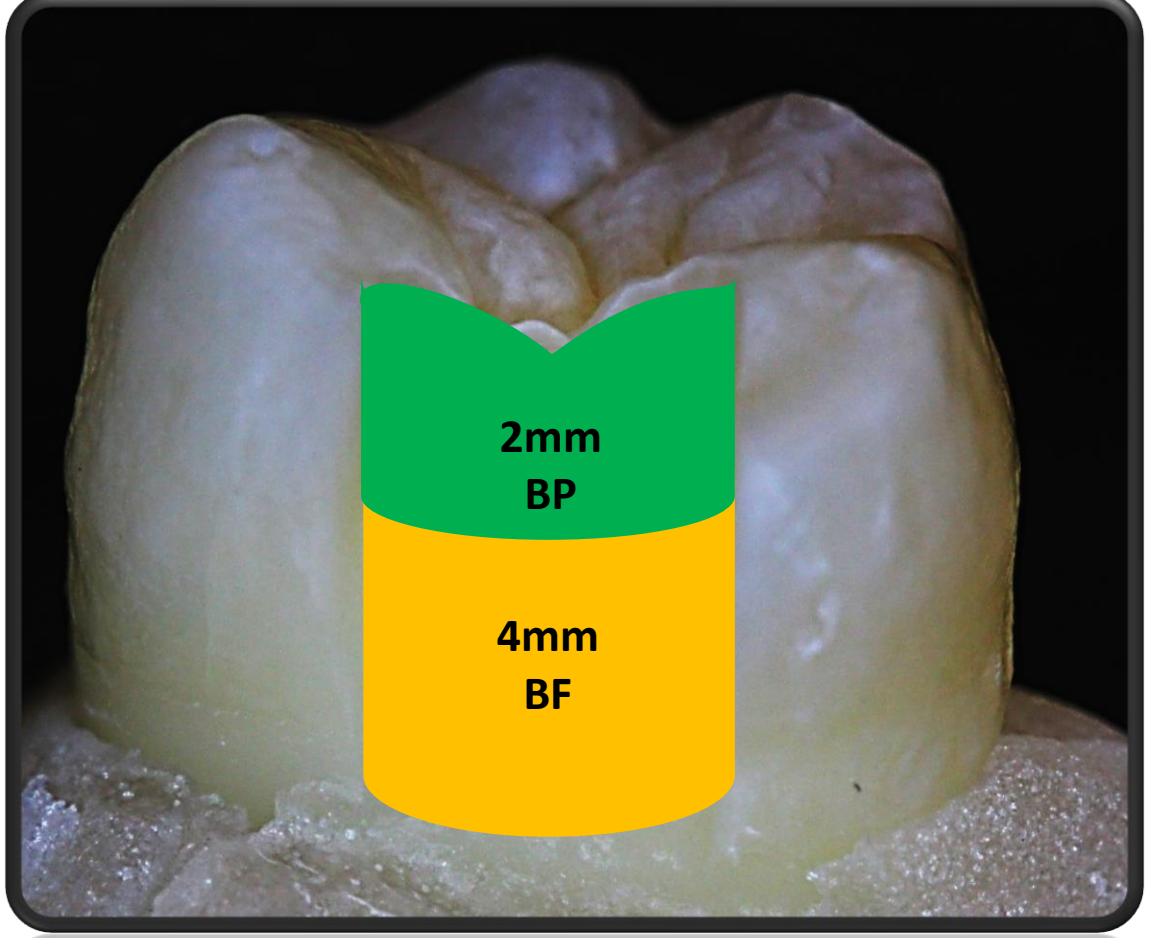
6. Using same applicator, apply **ADHESIVE** with light brushing motion for 15 seconds.

7. Air thin for 3 seconds.

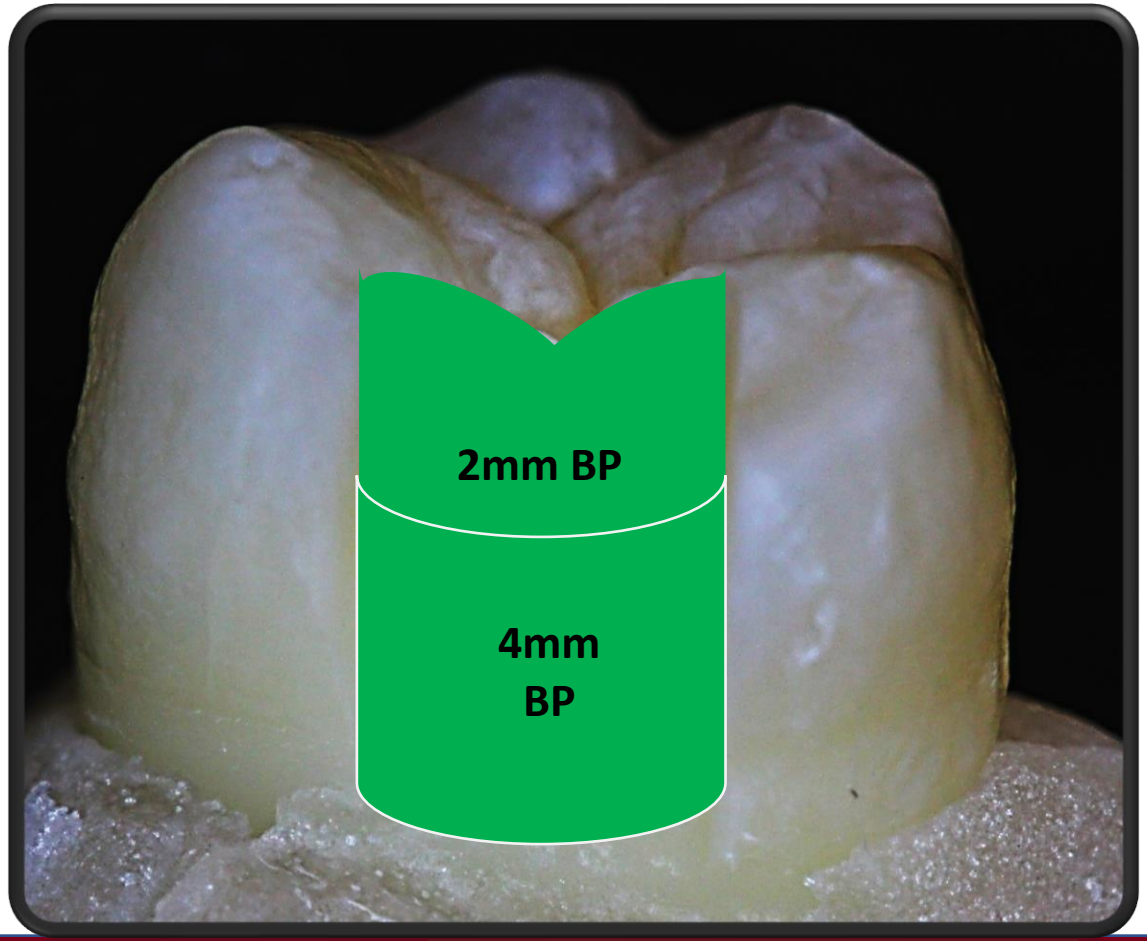
8. Light cure for 20 seconds. Surface is ready for composite placement.

Three-step etch-&-rinse adhesive (**Optibond FL, Kerr**) applied.

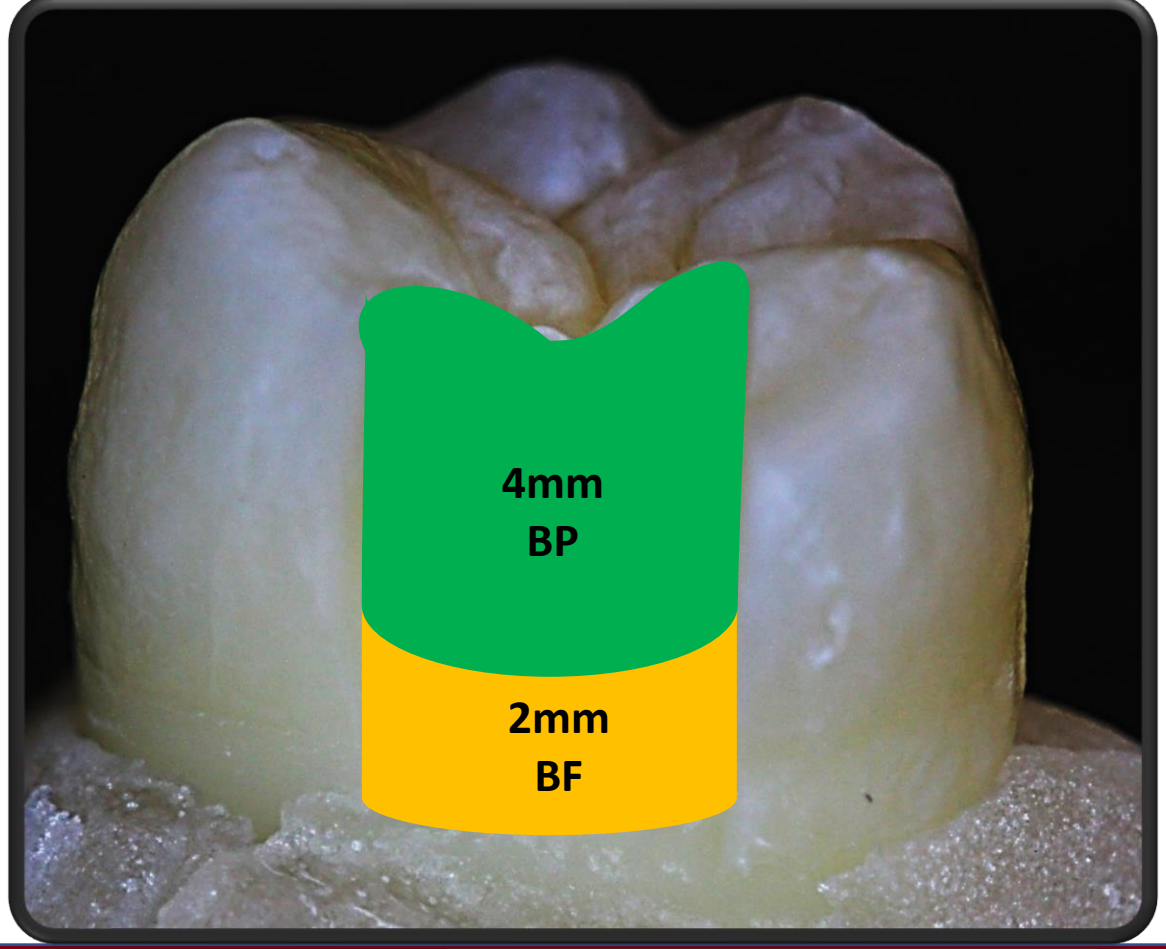
Group 1: BF4-BP2



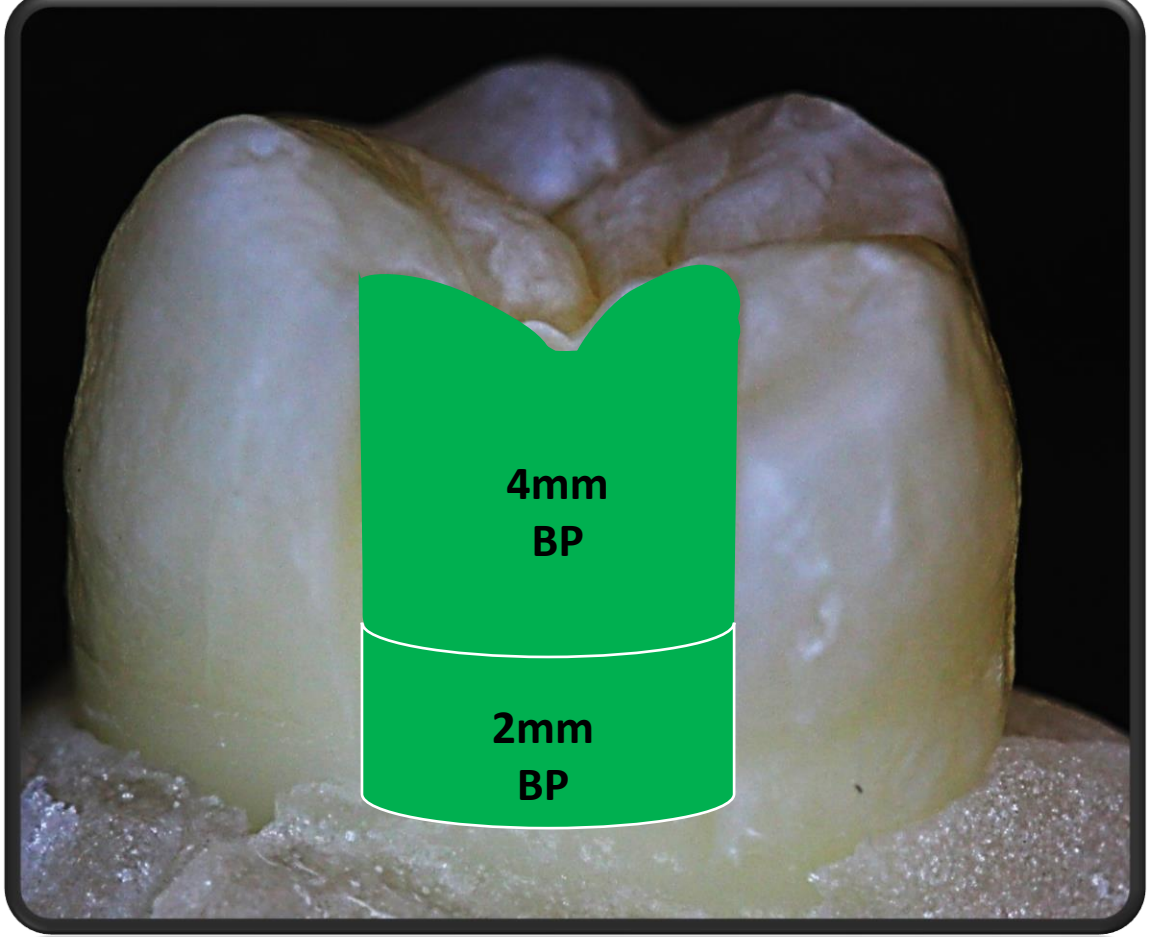
Group 2: BP4-BP2



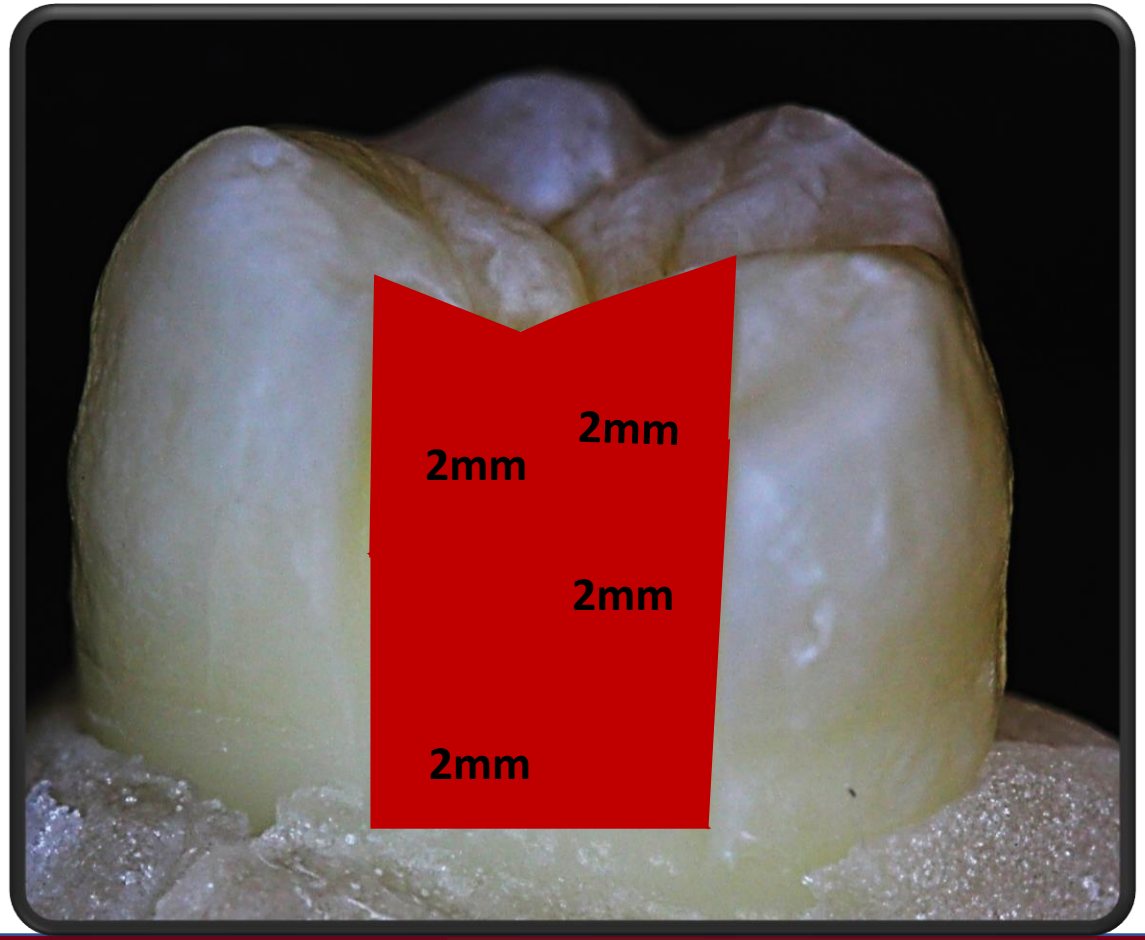
Group 1: BF2-BP4



Group 4: BP2-BP4



Control: Z250



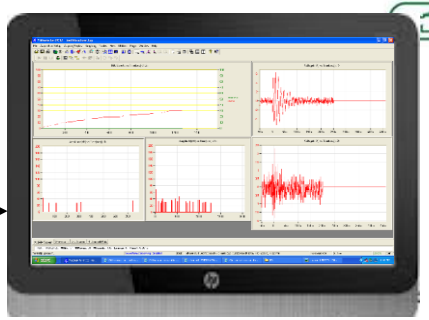
I. Acoustic emission (AE):

AE Sensor

Voltage Preamplifier

ADC

Analog to Digital Converter



Software for data analysis

AE sensor attached to the tooth, monitoring debonding from the start of curing for 10minutes.

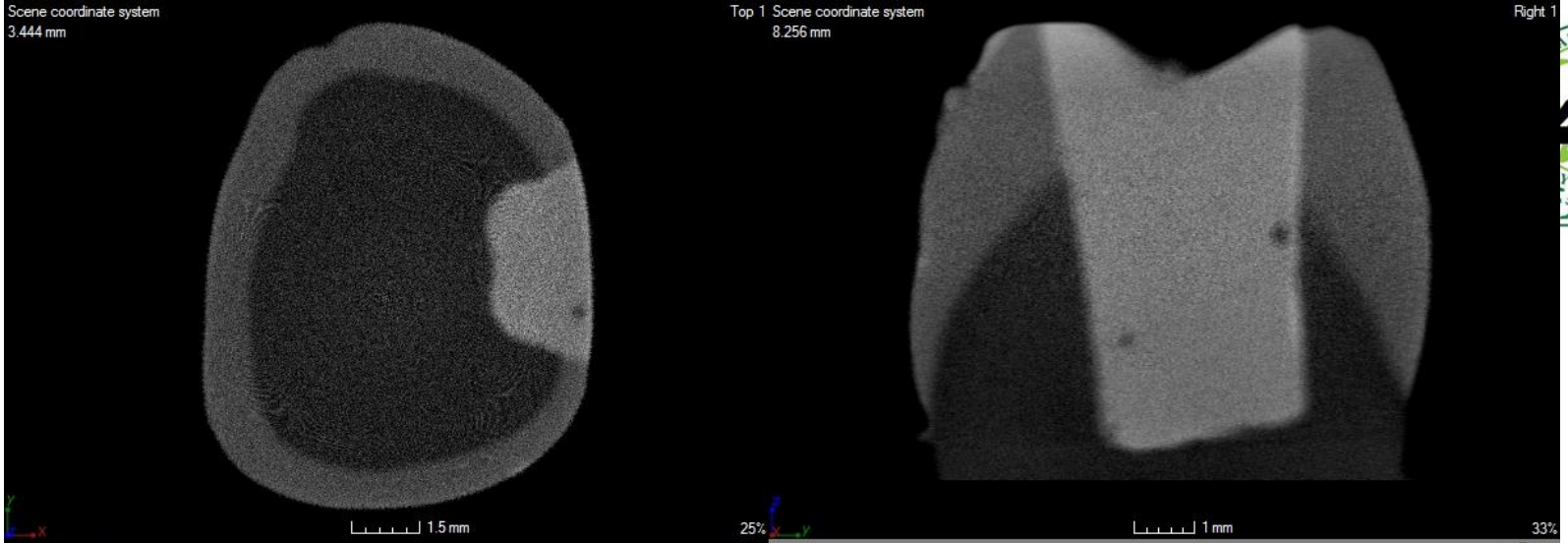
The phenomenon of radiation of acoustic (elastic) waves in solids that occurs when a material undergoes irreversible changes in its internal structure, for example as a result of crack formation or plastic deformation

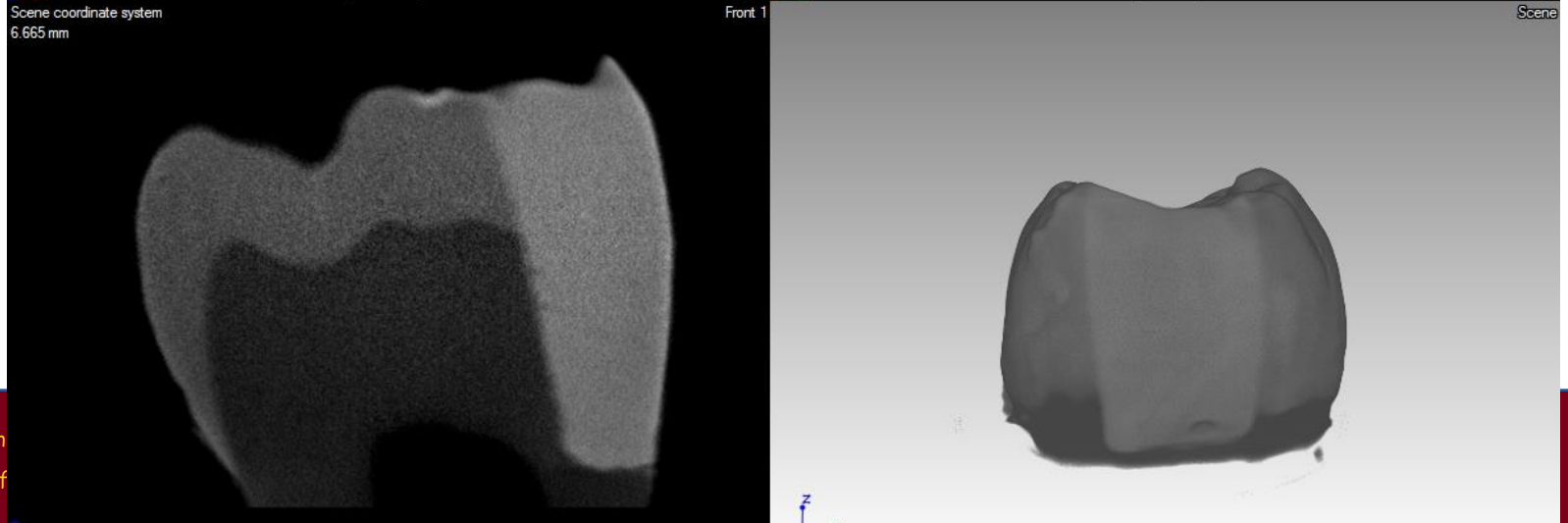
Micro-CT &SEM:

µ-CT Images captured before and after curing to assess interfacial integrity.

•SEM images for a closer look at the interface

II. Micro-CT





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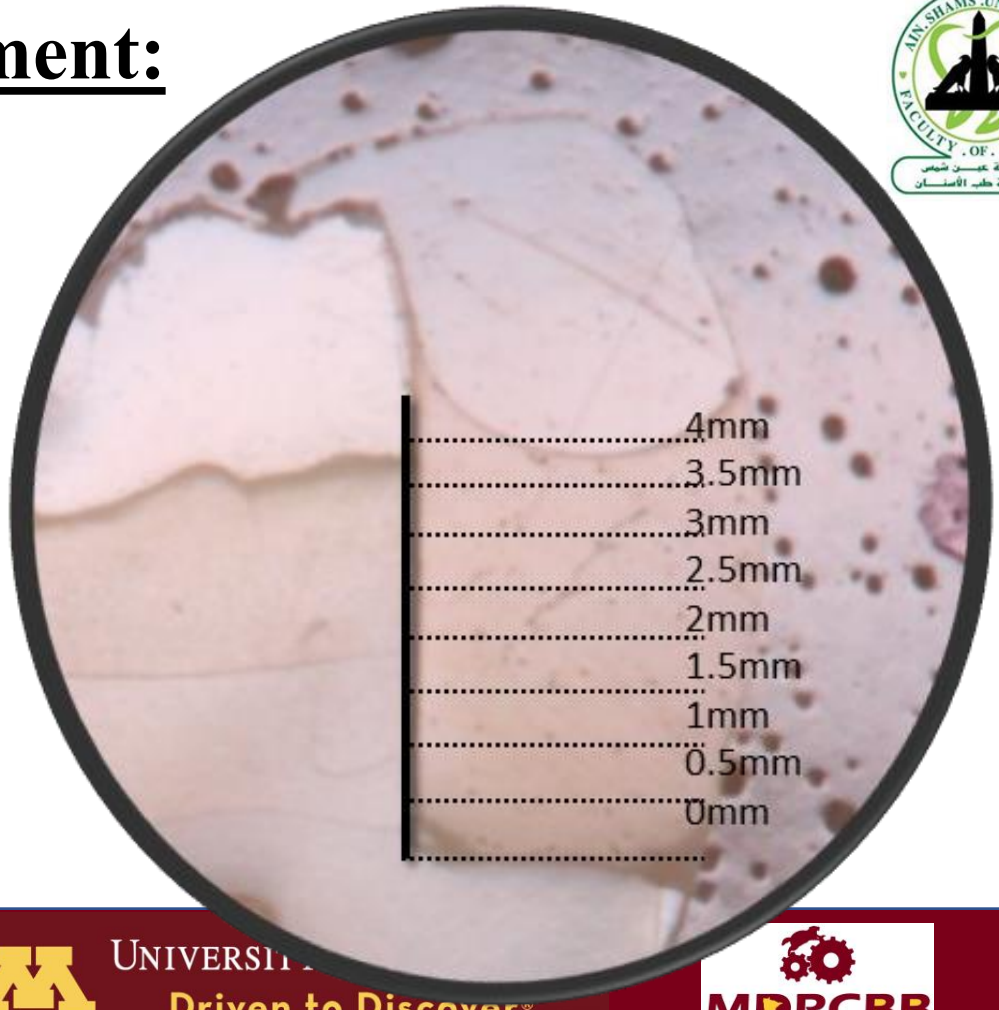
Scene coordinate system
0.700 mm
1.5 mm

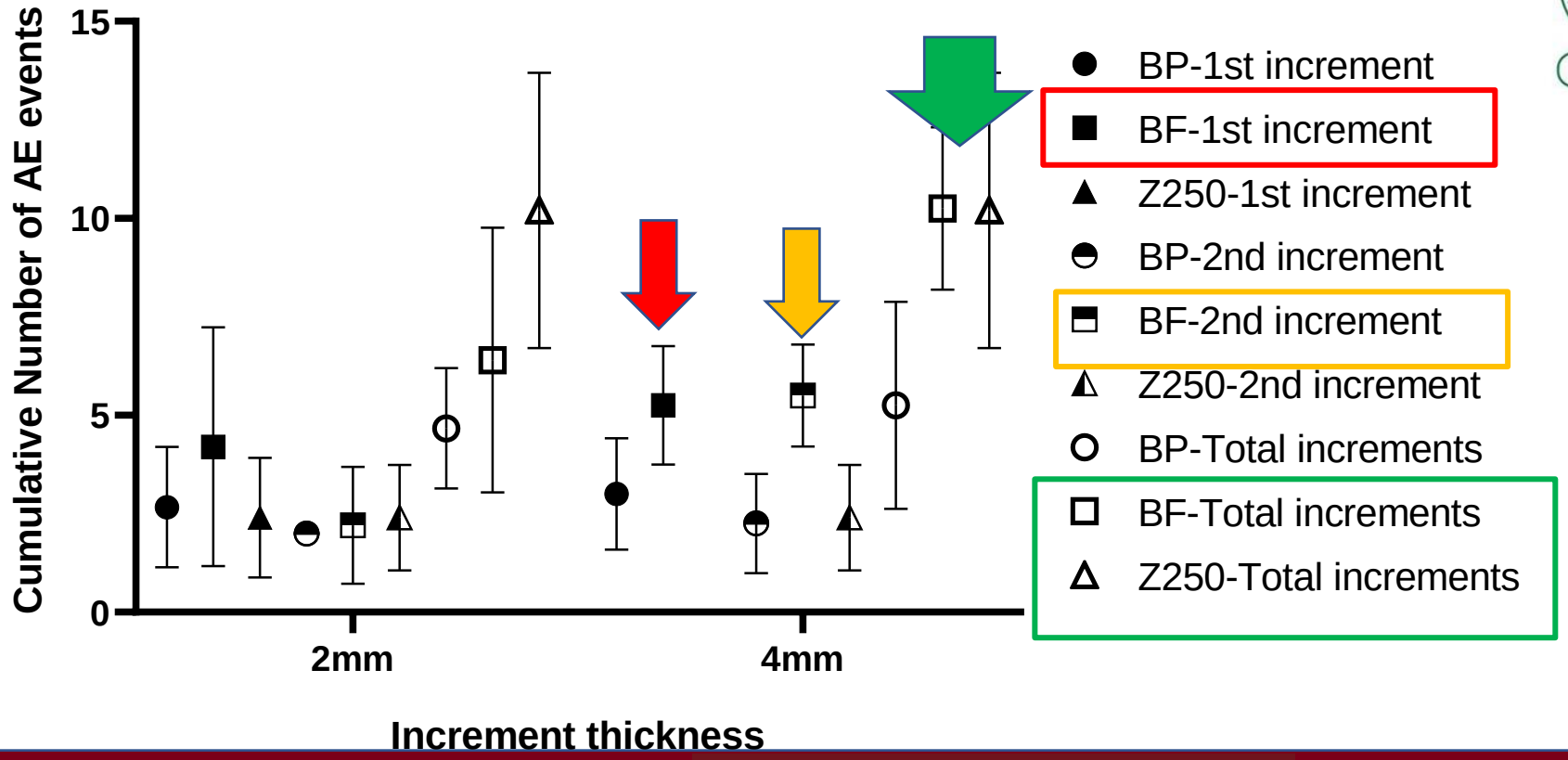
III. Hardness Measurement:

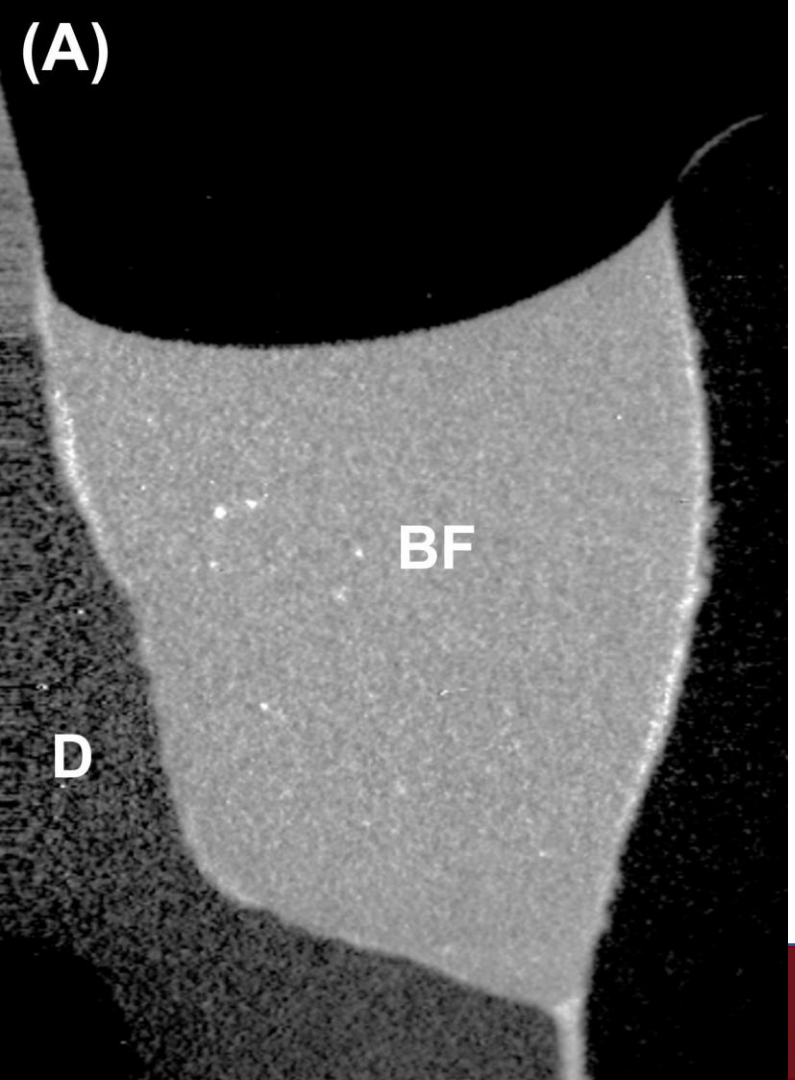
- 24-hours after curing,
- specimens sectioned MD
- (VHN) -(100g load-20sec)
- Depth intervals: 0.5mm occluso-gingivally.



Results

I. Acoustic emission (AE):

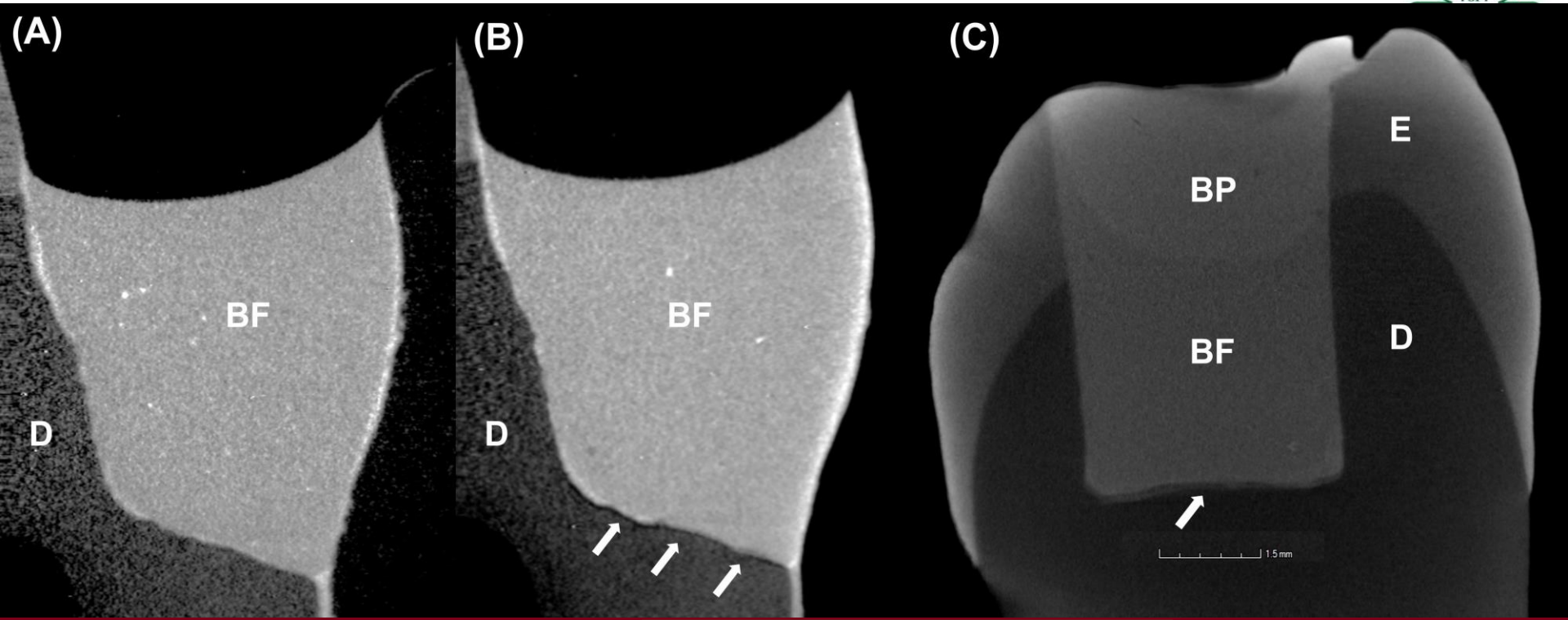




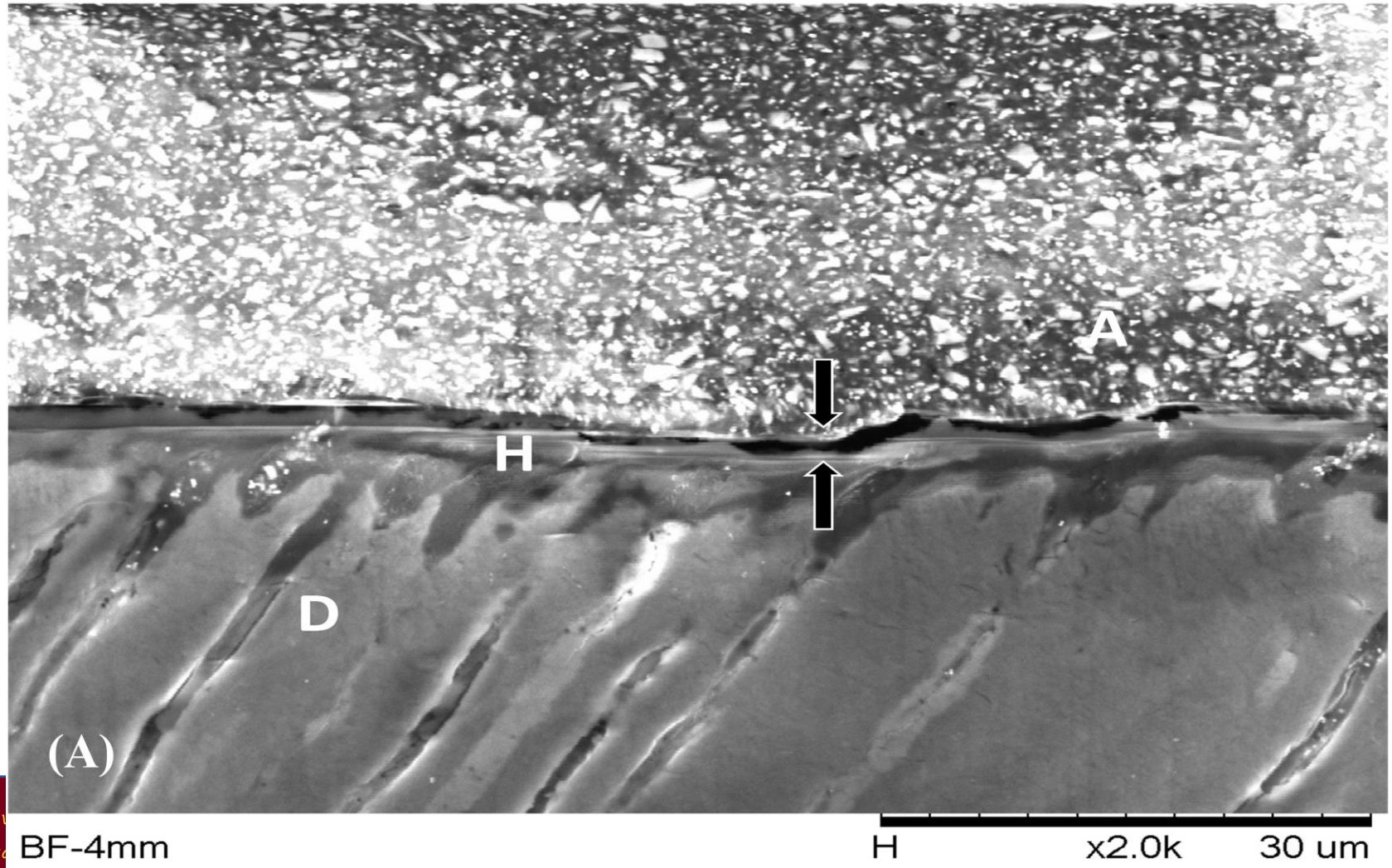
II. Micro-CT
BF 4mm- Before curing

Before Curing

After curing



III. Scanning Electron Microscopy



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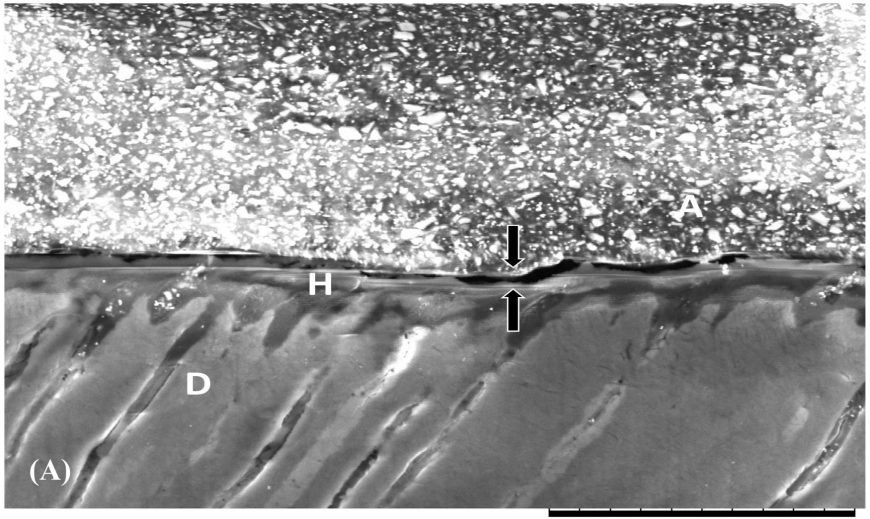

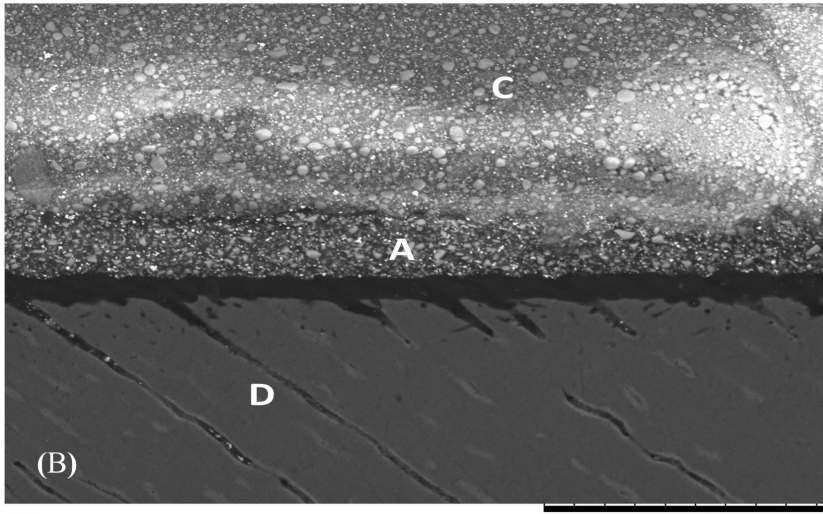

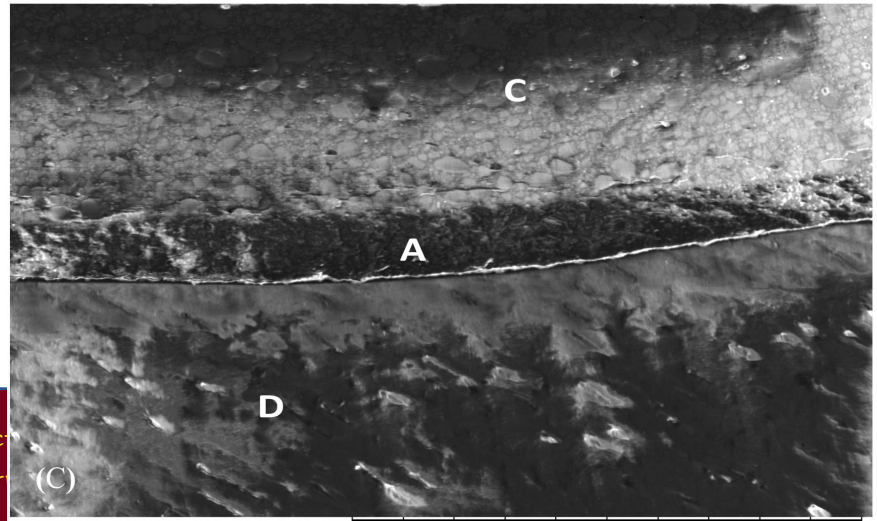

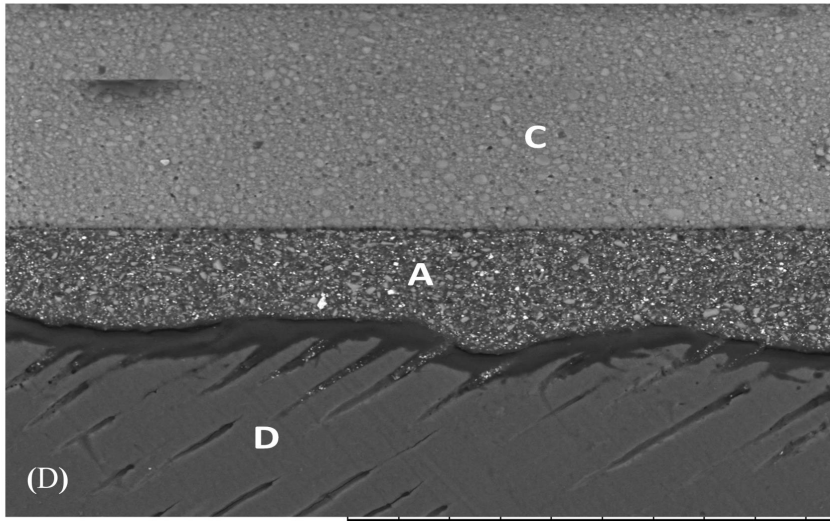

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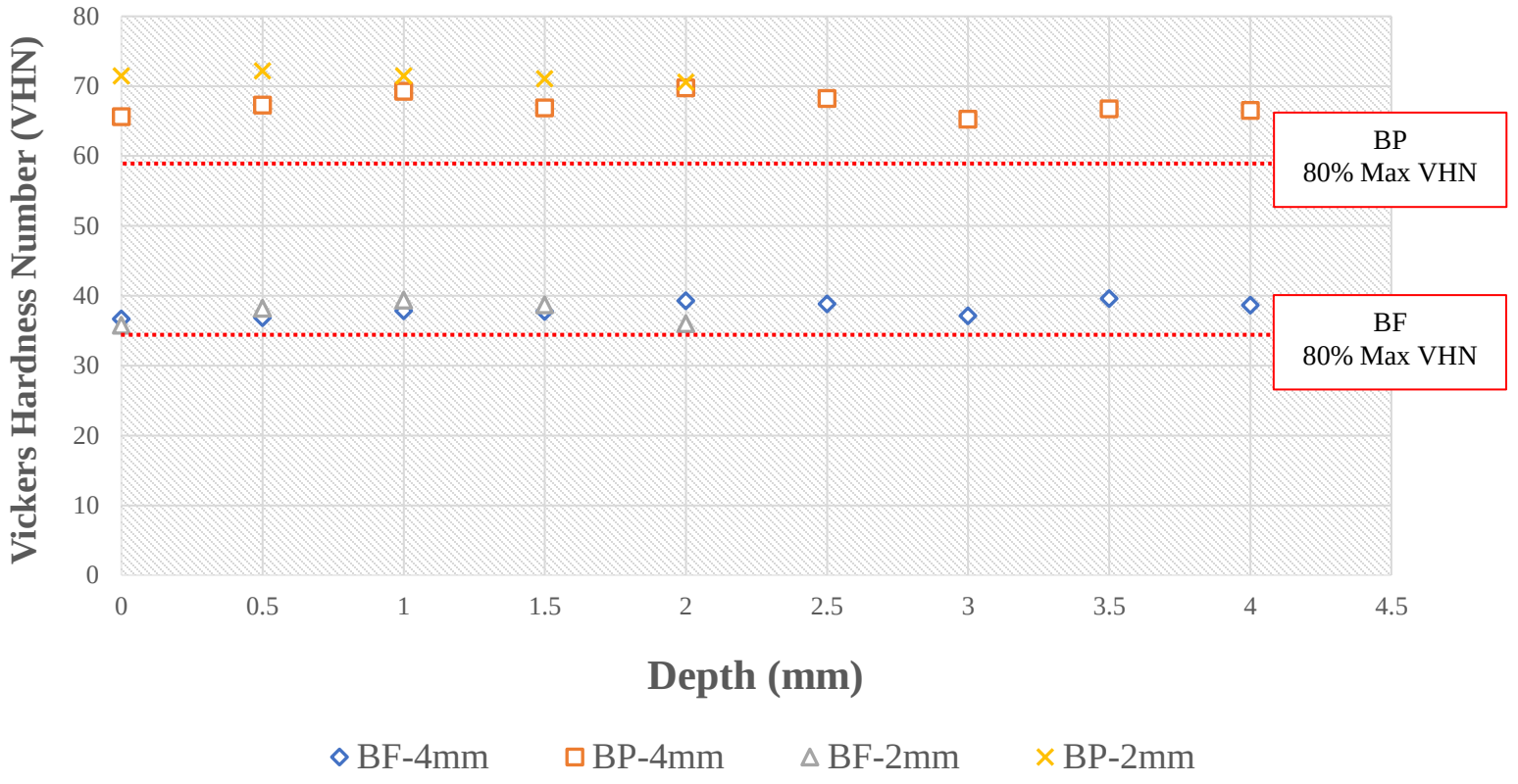
IV. Vickers Hardness Measurement



CONCLUSIONS

Within the limitations of this study:

Despite their increased depth of cure, bulk-fill resin composites with the potential of generating high shrinkage stress should not be used to bulk fill deep cavities, as this could lead to interfacial debonding.

Clinical Significance:

The thickness of the first increment should be lower than that recommended based on the depth of cure only to avoid interfacial debonding.

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