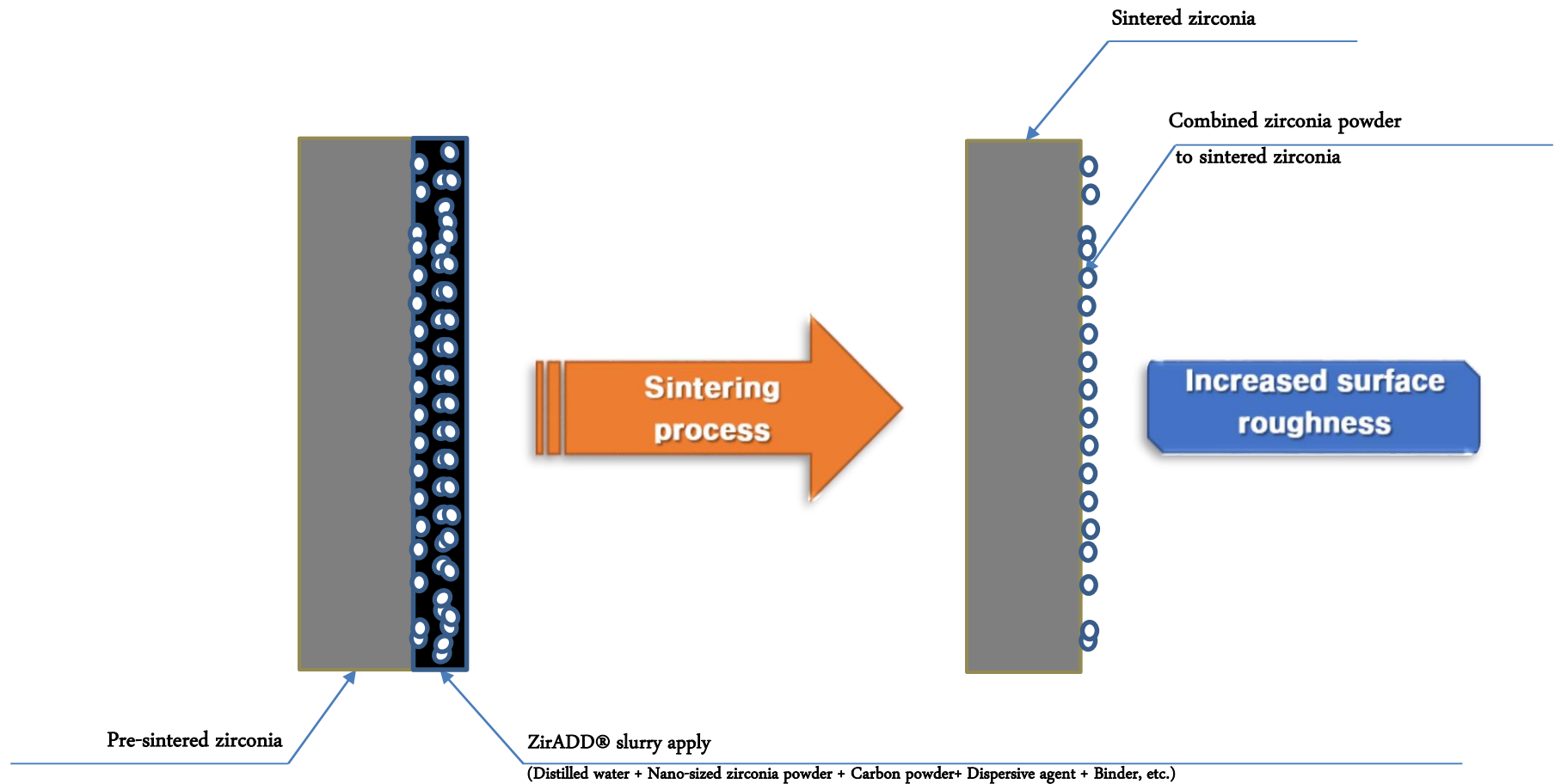


# ZirADD®

*The leader of new and advanced dental devices*

**PNU ADD**  
ADVANCED DENTAL DEVICES

# 1 ZirADD basic principle

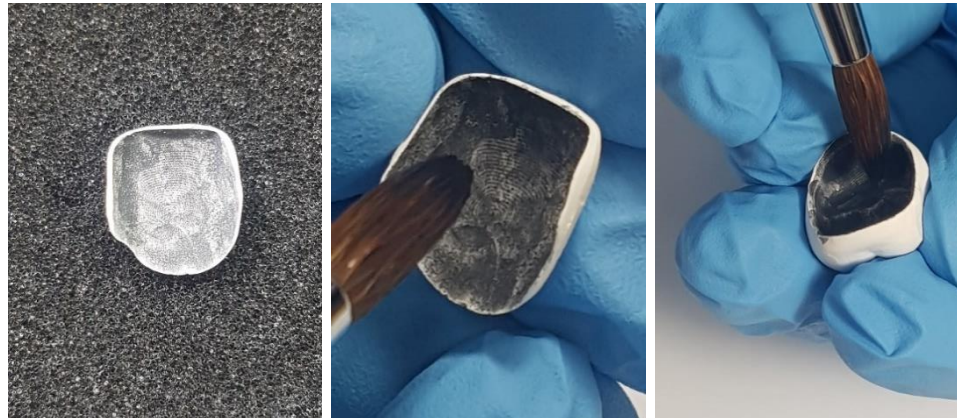


- After sintering, carbon and other slurry evaporate only zirconia particles attach the surface
- **Roughness can be adjusted** depending on the thickness, volume and size of zirconia particles applied

## 2 How to use ZirADD



The container will be replaced eye dropper lid



Black is caused by carbon particles, black color will be disappeared after sintering.

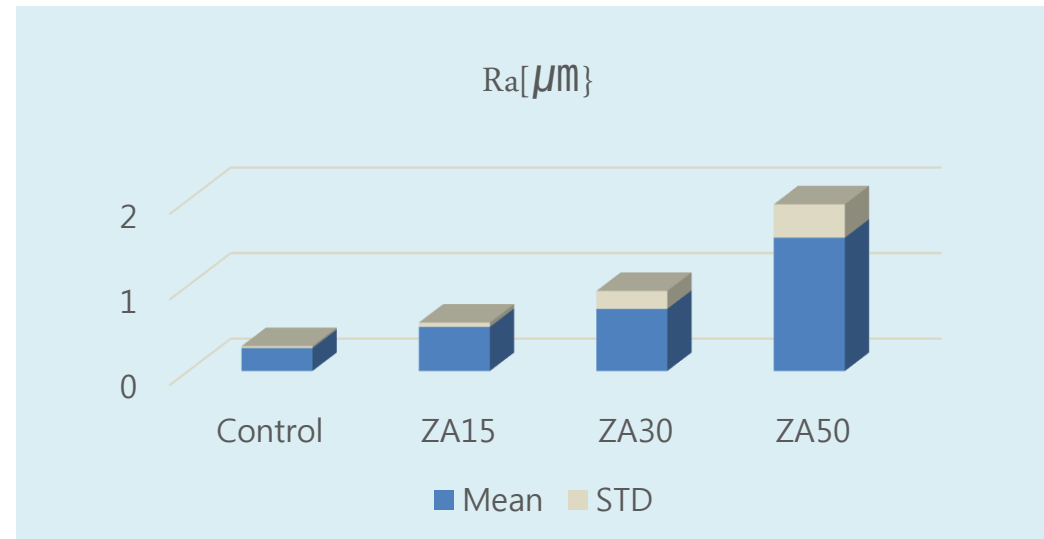
- **Shake well** to spread nano-sized zirconia and carbon particles in the solution
- Apply the slurry to the inner surface of zirconia crown(using brush or spray)
- Apply to the **pre-sintering stage of zirconia**

### 3 ZirADD preliminary experiments

#### Surface roughness

Group	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average
Control	0.252	0.272	0.284	0.217	0.288	0.285	0.249	0.279	0.274	0.282	$0.268 \pm 0.022$
ZA15	0.454	0.477	0.560	0.526	0.468	0.490	0.611	0.531	0.470	0.558	$0.515 \pm 0.051$
ZA30	0.602	0.634	0.673	0.669	0.567	0.979	0.566	0.513	0.938	1.123	$0.726 \pm 0.209$
ZA50	1.269	1.697	1.998	1.028	1.987	2.040	1.282	1.823	1.146	1.310	$1.558 \pm 0.390$

Control: No treatment; ZA15, ZA30, ZA50: ZirADD® with 15, 30, and 50% concentration

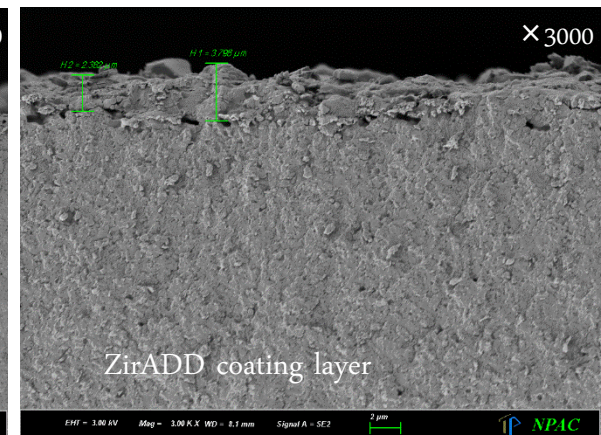
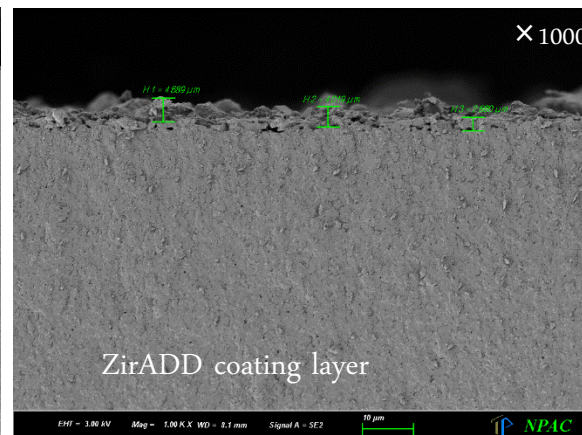
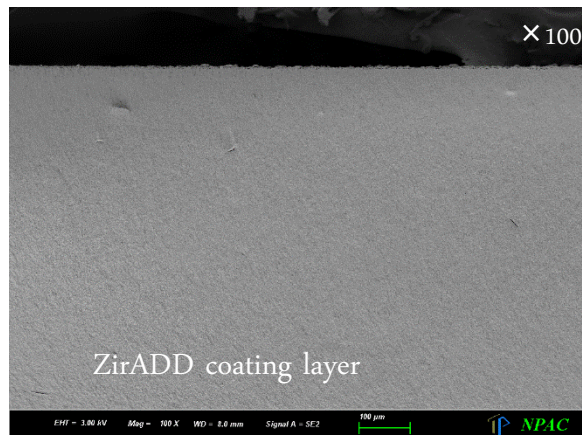
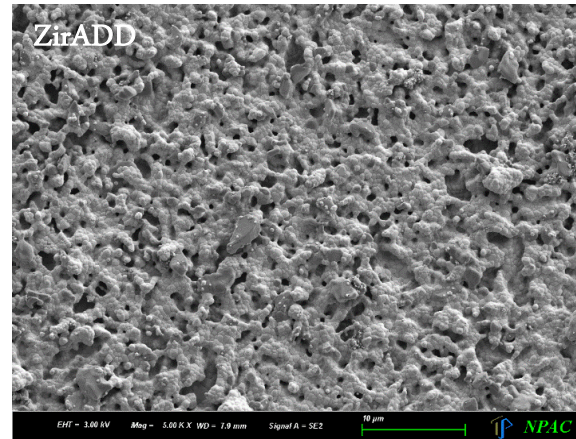
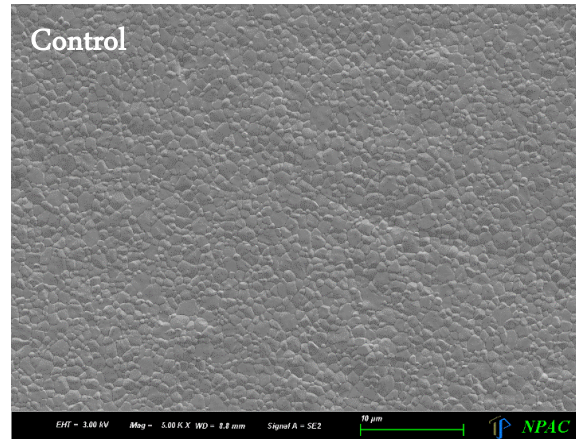


➤ When slurry with higher concentration was applied, the roughness was increased.



# 3 ZirADD preliminary experiments

## Surface roughness



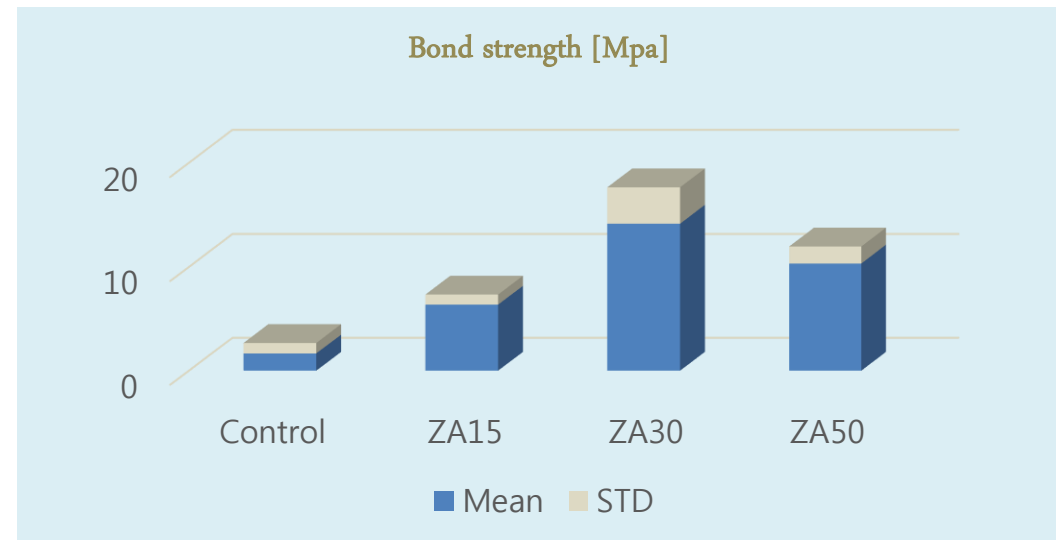
Thickness of roughened surface is measured about **3-4 µm** within this test condition

### 3 ZirADD preliminary experiments

Bond strength

Sample	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average
Control	0.34	0.18	0.97	1.38	1.46	1.62	2.68	3.55	2.69	1.73	$1.661 \pm 1.006$
ZA15	5.47	6.57	5.70	4.75	7.53	7.90	7.11	6.46	5.82	6.35	$6.365 \pm 0.970$
ZA30	14.09	10.59	16.45	17.77	17.77	15.68	17.78	12.52	8.28	10.59	$14.151 \pm 3.488$
ZA50	11.48	10.28	7.92	12.32	10.06	9.84	8.71	9.30	10.07	13.32	$10.329 \pm 1.634$

Control: No treatment; ZA15, ZA30, ZA50: ZirADD® with 15, 30, and 50% concentration

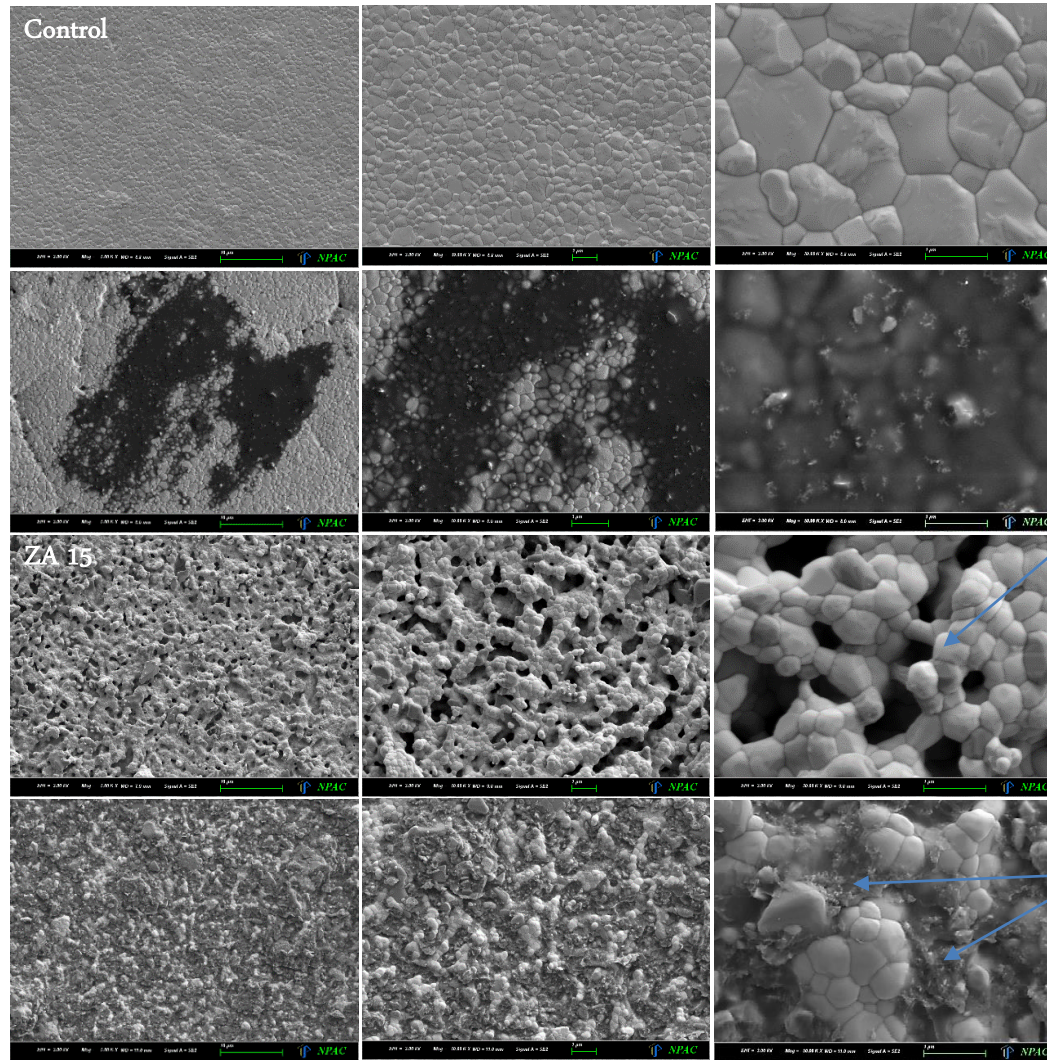


- The bond strength of the ZA group is relatively higher compared to the Control.
- If this test is performed with other condition or resin cement with chemical agent, the result may be different.



# 3 ZirADD preliminary experiments

Bond strength



Nano size  
 $\text{ZrO}_2$  particle

Resin cement

It is confirmed that resin cement is integrated to the roughened surface of zirconia:

Due to the increasing of binding strength between resin and zirconia surface caused by increased roughness, cohesive fracture was occurred and residual resin on the zirconia surface was detected.