

도재용착주조관용 비귀금속 합금의 사전 열처리가 도재-금속의 결합 강도에 미치는 효과

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=Abstract=

The Effect of Oxidation Heat Treatment on Porcelain to Metal Bond Strength

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The interfacial bond strength and microstructural analysis of pre-heat treated porcelain-fused-metal(PFM) were investigated using a mechanical three-point bending tester and scanning electron microscope(SEM). Four kinds of heat treated samples were prepared as follows ; A:Heating 1200 1600 , holding 1min , reheating 1850 , hold 3min under vacuum, B: heating 1200 1600 , holding 1min, reheating 1850 under vacuum conditon, C: heating 1200 1600 , holding 1min, reheating 1850 , holding 3min in the air, repeat same heat treatment process under vacuum condition, D: heating 1200 1600 , holding 1min, reheating 1850 , holding 1min in the air. The three-point bening test result shows that the interfacial bond strength of specimen B and C were higher than that of A and D. The SEM study indicate that Specimen C shows the highest surface density.

1. 서 론

가

degassing degassing
 60%
 가
 -
 Ni-Cr ,
 , 가
 가 가 가
 가 가
 가
 Van der Waal's force
 -
 가
 Vickery
 22%, Van der Waal's force
 52%,
 26%

II. 실험 재료 및 방법

1. 실험재료

Be Ni-Cr
 Verabond(Chosun Dental Co., U.S.A)
 Vintage porcelain powder(Shofu Dental Mfg.
 Co., Japan)

2. 실험방법

1)

가 1.1 × 12 × 30mm가
 base plate wax(Han Deuk Chemistry. Inc.,
 Korea) 10 40
 Hi-
 temp(Whip mix corp., U.S.A)
 (DAIEI Dental Co.
 Ltd., Japan) , furnace
 30 600 30

Ni-Cr-Mo Cr₂O₃, NiCr₂O₄
 가 -
 Wagner
 152% 가
 Mackert 가
 Daftary degassing, double degassing,
 가
 degassing 가

2) Finishing

50 μ m Al₂O₃
 sand blasting
 Vera Sand blasting disc(AALBA Dent, Int., U.S.A)
 sprue emery paper
 50 μ m Al₂O₃ Sand blasting
 Al₂O₃ sand blast
 interlocking

3)

Sand blasting steam cleaner(Omec Co., Italy)
 (JaeMyoung Industrial Co., Korea)
 < 1 >

(SEM, Hitachi Co., Japan)

Table 1. Preparation specimen for three-point bending test.

Specimen	Pre-heat treatment Condition (100°F/min)	Temp(°F)[Hold time(min)]
A	Vacuum	1200 → 1600[1] → 1850[3]
B	Vacuum	1200 → 1600[1] → 1850[N]
C	Air → Vacuum	1200 → 1600[1] → 1850[3]
D	Air	1200 → 1600[1] → 1850[3]

4)

12mm
 Vintage B₂O porcelain
 Vintage B₂B porcelain
 porcelain
 adjustment kit(Shofu Dnetal Mfg. Co., Japan)
 가 1.2mm가
 micro meter
 <

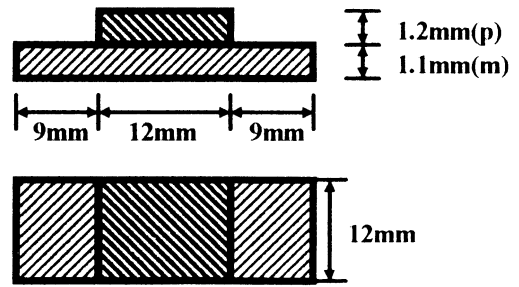


Fig 1. Schematic diagram of specimen for the three point bending test(P : porcelain, m : metal)

5) Three point bending test

UTM(United Calibration Co., U.S.A)
 Three point compression cage
 가
 0.5mm
 가
 .(2)

III. 결과 및 고찰

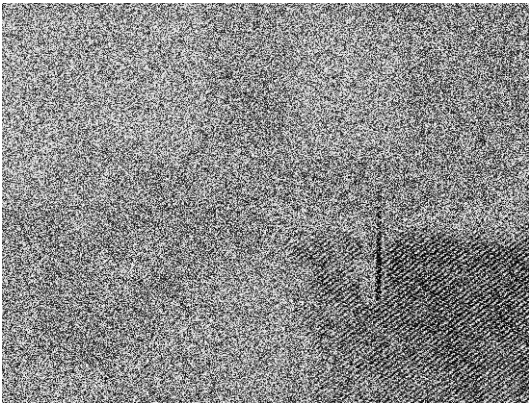


Fig 2. A fixture for three-point bending test.

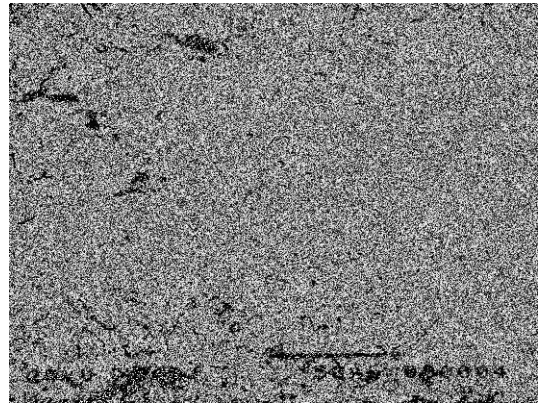


Fig 3. The SEM picture of the specimen A (1200 1600[hold 1min] 1800[hold 3min] under vacuum, ×500)

가 . - 가

가 가

가 degassing

가 < 3 6>

가 증가 < 2, 3>

가 가 < D 3>

A < 6>

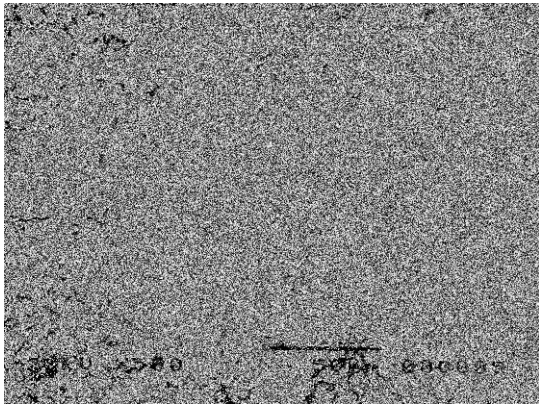


Fig 4. The SEM picture of the specimen B(1200 1600[hold 1min] 1800[no hold] under vacuum, ×500)

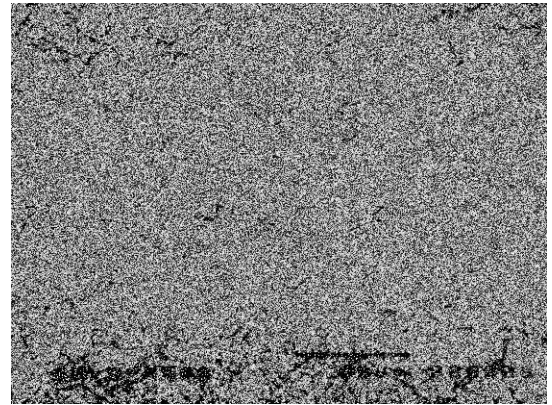


Fig 5. The SEM picture of the specimen C(1200 1600[hold 1min] 1800[hold 3min] first : in air, Second : under vacuum, ×500)

Table 2. Maximum bending stress test (: Kg/mm)

시편번호	A	B	C	D
1	15.74	15.17	17.78	14.96
2	16.42	16.42	15.04	15.33
3	16.63	16.55	15.05	14.43
4	14.43	14.87	15.45	12.38
5	14.76	16.32	17.74	14.23
6	13.84	14.91	16.76	12.56
7	15.70	16.97	15.40	13.26
8	15.26	17.11	17.96	12.98
9	14.48	16.57	16.71	14.97
10	15.62	16.33	15.14	14.47

합계 $T_1=152.88$ $T_2=161.19$ $T_3=163.03$ $T_4=139.57$

평균 A=15.288 B=16.119 C=16.303 D=13.957

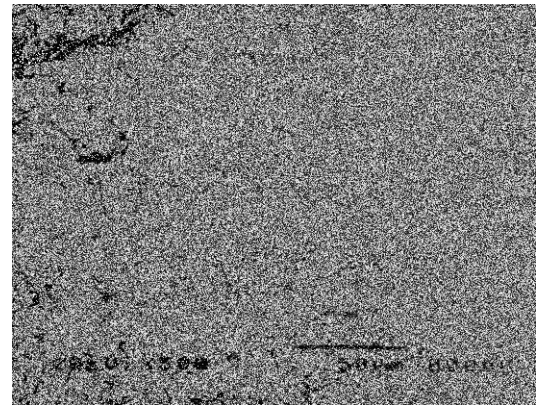


Fig 6. The SEM picture of the specimen D(1200 1600[hold 1min] 1800[hold 3min] in air, ×500)

Table 3. One-way analysis of variance

	자유도	평방합	불편 분산	F	Prob.
표본간	3	34.2604	11.4201	11.0020	.0000
표본내	36	37.3681	1.0380		
합 계	39	71.6285			

가 가 B
 C B ,
 가 <
 4>
 . C , <
 5>
 1

2

가

Wu
가

참고 문헌

가

가

2

degassing

Table 4. t-test for paired sample

항목간	자유도	t값	Prob.
A-B	18	-2.14	P< .05
A-C	18	-2.11	P< .05
A-D	18	3.00	P< .01
B-C	18	-0.39	P> .05
B-D	18	5.03	P< .01
C-D	18	4.56	P< .01

IV. 결론

(SEM) three point

bending test

1. (SEM)
2 degassing (C) 가

(B)

2.

(B),
2

degassing (C)

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