LOCTITE ABLESTIK ICP2120 DATAPKG

-WGQ LAB

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PRODUCT DESCRIPTION

Application

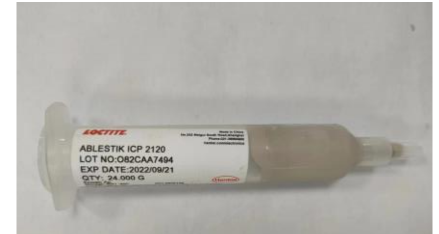
- Low temp/moisture curable ECA for CCM bracket grounding.

Adhesion interface

- SUS, Ni

Advantages

- Excellent DCR and VR performance
- RT temp cure (>=3days) or Lower curing temp(50C 30mins)
- High thermal conductivity
- Low tensile Modulus



Musashi syringe

Transparent piston

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AGENDA

01 Material Property

02 Work life

03 Shore hardness

04 Curing profile

05 DCR test

06 Adhesion test

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MATERIAL PROPERTY MATRIX

Item	Description	ICP2120	ABP2032s
Technology		Silicone	Epoxy
Filler type		Silver	Silver
Good dispense	Brookfield CP51,25°C，mPa.s(cP), Speed 5.0rpm	28000	11000
	TI	2.5	4.5
Worklife	@25C (hours)	24hrs	24hrs
Curing profile		0.5hr@50C/RT 3days	1hr@80C
Tacky Free	23C 50% RH (mins)	20	-
Thermal Conductivity	W/(m-K)	7	3-4
DMA	25C/100C/250C(Mpa)	900/284/311	4651/1204/322
Volume Resistivity Thickness 30um	25C 50%RH 24hrs (ohm-cm)	0.00006	0.0002(80C 1hr)
	50C 0.5hr bake (ohm-cm)	0.00015	
	50C 0.5hr bake+24hrs (ohm-cm)	0.00007	
DSS (2*2mm Si on substrate)	SUS304 sub / 50C 30mins(Mpa)	1.2	37(80C 1h)
	SUS304 sub / 72hrs(Mpa)	5	
Shelf life	-40C, days	180	365

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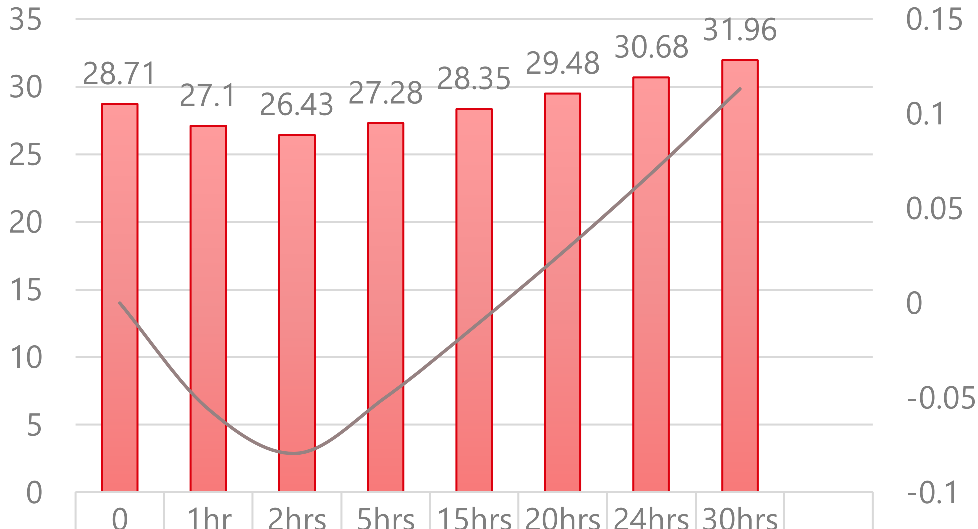
WORK LIFE STUDY
VISCOSITY TEST DATA



	0	1hr	2hrs	5hrs	15hrs	20hrs	24hrs	30hrs
20 S-1[Pa.S]	28.71	27.1	26.43	27.28	28.35	29.48	30.68	31.96
Ti	1.89	1.95	1.98	1.94	1.87	1.84	1.86	1.83
Variation	0	-5.6%	-7.9%	-5.0%	-1.3%	2.7%	6.9%	11.3%

Parameter

ICP2120 viscosity work life criterion

- Under room temperature 25C
- Rheometer 20S^{-1} test data
- Viscosity increasement <25%

Summary

- Viscosity in 24hrs<25%
- To cover various customer's environment ,recommend work life 24hrs

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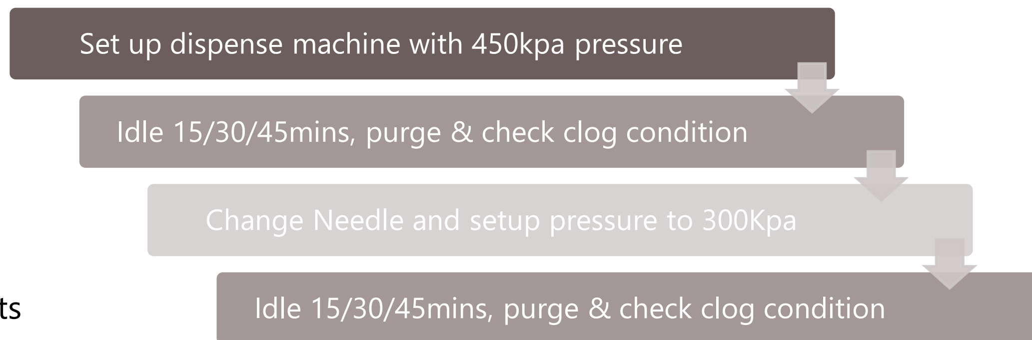
WORK LIFE STUDY
DISPENSING TEST DATA

Test parameter:

- Dispenser: Musashi PC350
- Needle: EFD G25 1/4inch, 0.25mmφ
- Lab environment: 25C/55%RH
- Test pressure: 300/450Kpa
- Test data: needle dispensing clog test with time points
- Test time point: 15/30/45mins

Test Flow:



Test summary: No clog issue within 45mins machine idle time >300kpa pressure on EFD G25 needle

Machine	Pressure	Needle size	15mins	30mins	45mins
Musashi PC350	300KPa 450KPa	EFD G25, 0.25mm	No clog	No clog	No clog

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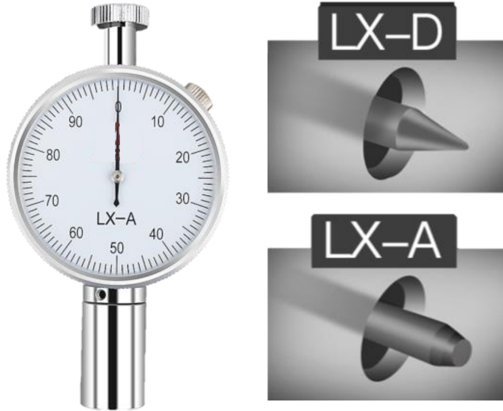
ADHESIVE CURED HARDNESS

TEST ENVIRONMENT

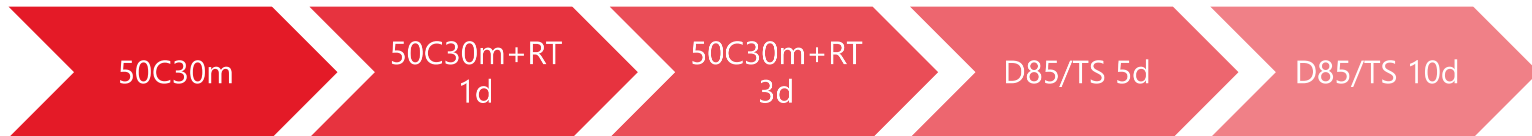
Shore hardness detector



Test parameter:

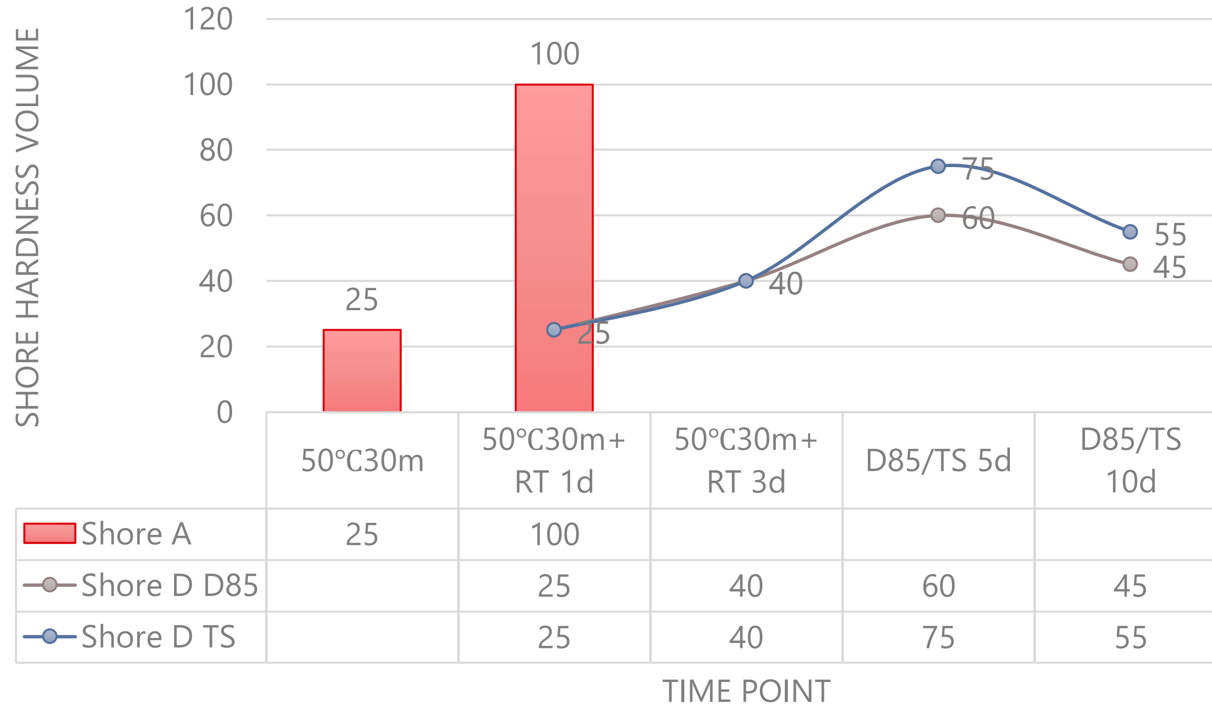
- Sample size: 10mmφ+ 3~4mm thickness
- Thermal cure:50C/30mins
- Test data: Shore A/D
- Room temp cure: 1/3days 25C/55RH%
- HTHH/D85: 85C/85RH%
- TS: -40C 30mins+85C 30mins /cyc

Thermal cure test procedure



RT cure test procedure

ADHESIVE CURED HARDNESS
WITH THERMAL



	50℃30m	50℃30m+ RT 1d	50℃30m+ RT 3d	D85/TS 5d	D85/TS 10d
Shore A	25	100			
Shore D D85		25	40	60	45
Shore D TS		25	40	75	55

Summary

Curing stage

- ICP2120 curing with thermal, shore hardness data continues increase from shore A25 to D40

RA stage

- ICP2120 shore hardness achieve peak @5days, then goes down slowly.

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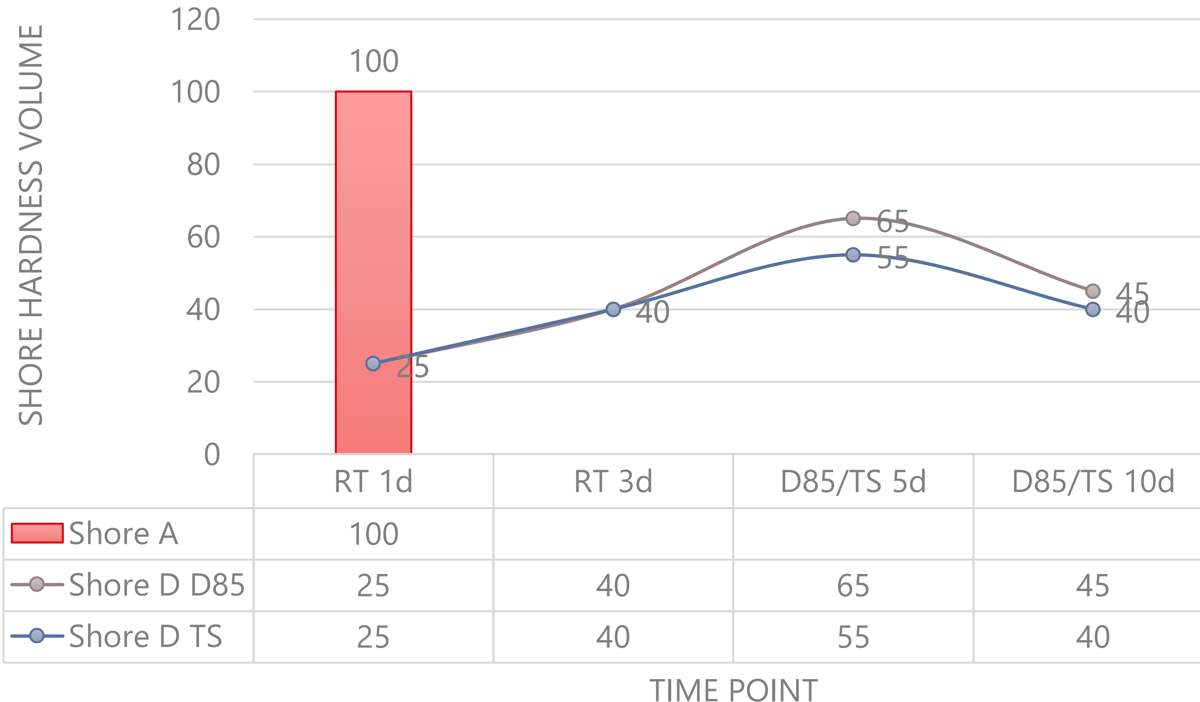
ADHESIVE CURED HARDNESS
WITH ROOM TEMPERATURE



	RT 1d	RT 3d	D85/TS 5d	D85/TS 10d
Shore A	100			
Shore D D85	25	40	65	45
Shore D TS	25	40	55	40

Summary

Curing stage

- ICP2120 curing with RT, shore hardness data continues increase from shore A100/D25 to D40

RA stage

- ICP2120 shore hardness achieve peak @5days, then goes down slowly.

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01 Material Property

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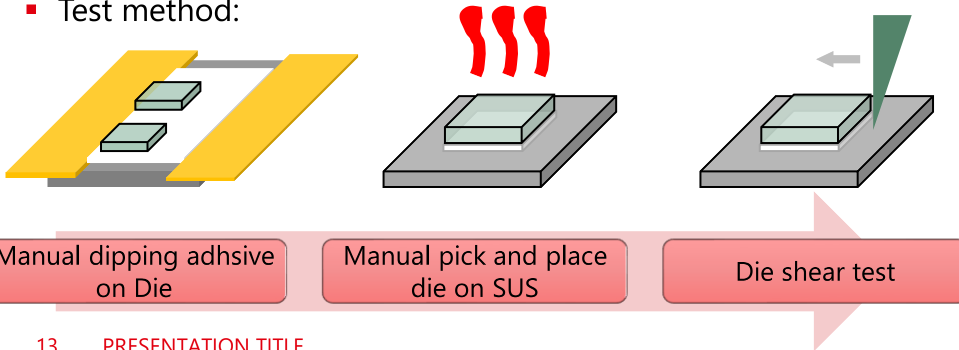
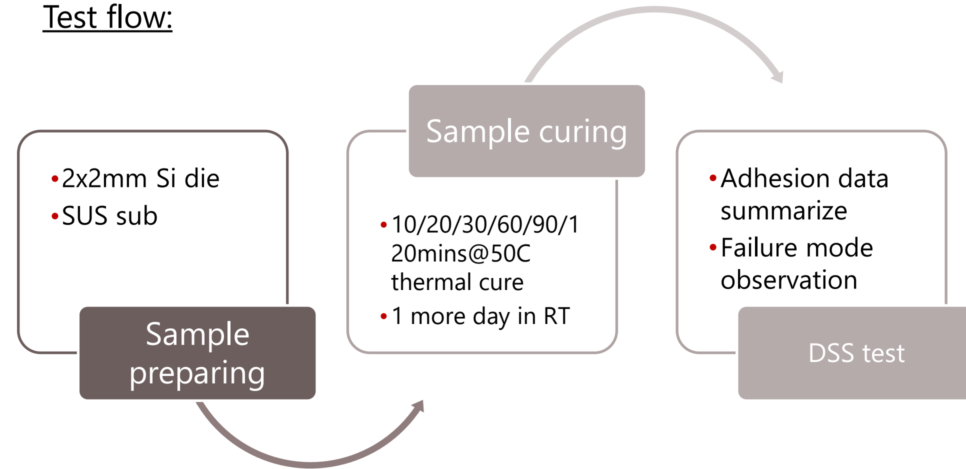
CURING PROFILE STUDY
TEST PARAMETER AND FLOW

Test parameter:

- Die size: 2*2mm Si die(370um thickness)
- Substrate: SUS without plasma
- BLT: 30-40um
- Test data: Adhesion with different profiles
- Curing profiles: 10/20/30/60/90/120mins@50C +RT 1day
- Test method:



Test flow:



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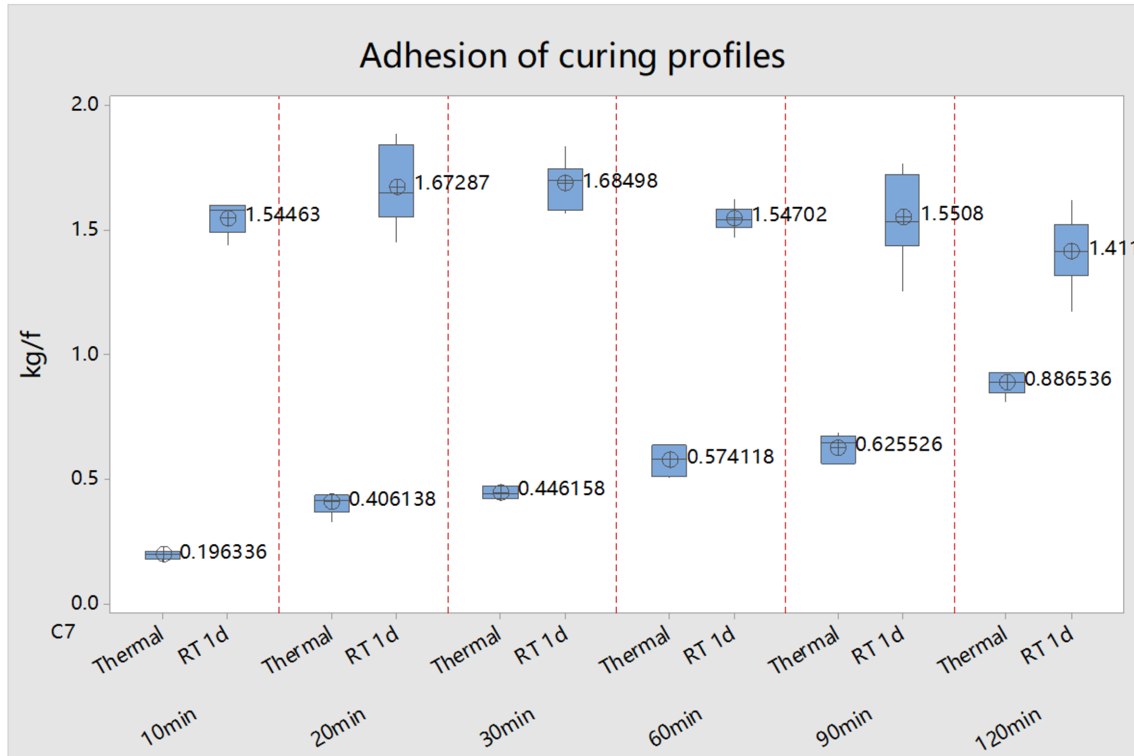
CURING PROFILE STUDY

TEST DATA



Summary

Thermal stage

- With longer thermal baking time, ICP2120 adhesion performs increasing.
- Failure mode: 10-60mins, surface tacky free only, with more than 90mins, ICP 2120 fully cured

Thermal +1day RT stage

- 30mins +1day RT group adhesion >others
- All failure mode is cohesive

30mins@50C +1day RT cure profile as recommendation.

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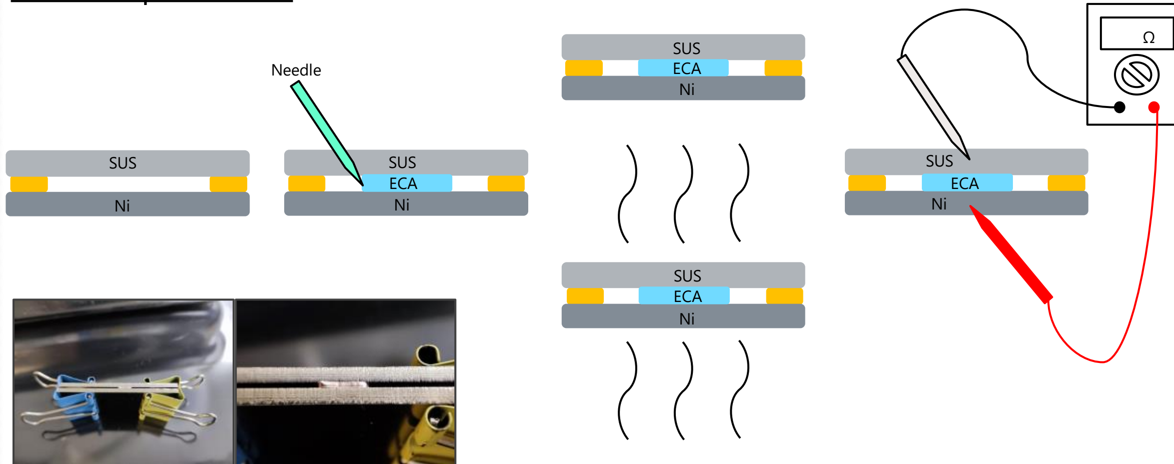
ADHESIVE DCR(DIRECTLY CONTACT RESISTANT) TEST

TEST ENVIRONMENT



Test parameter:

- Gap size: 500um
- Substrate: SUS/Ni, Ni with plasma
- Adhesive: ICP2120, ABP2032s
- Curing profile:
  - ICP2120:RT 3days, 30mins@50C+RT 1/3days
  - ABP2032s: 1hr@80C
- HTHH(85C85RH%): 5/10 days
- TS(-40C 30mins+85C 30mins /cyc): 5/10 days

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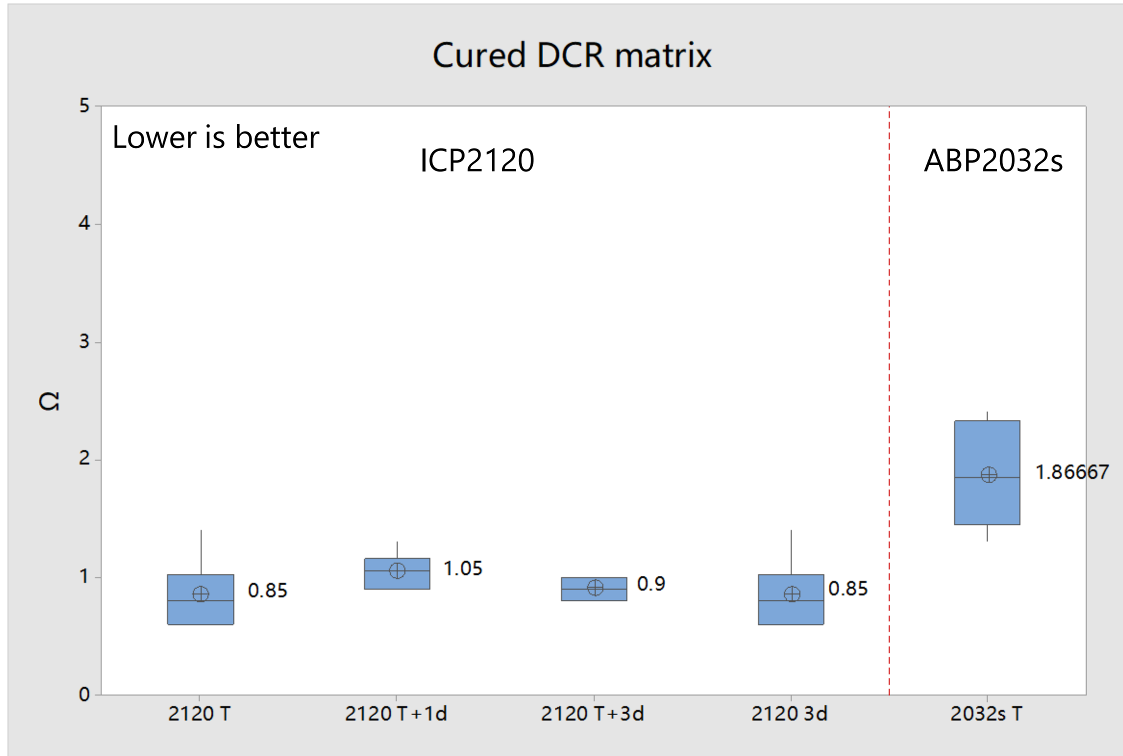
ADHESIVE DCR(DIRECTLY CONTACT RESISTANT) TEST

DCR DATA OF CURED



Summary

- 2120T: ICP2120 30mins@50C
- 2120T+1d: ICP2120 30mins@50C+RT 1d
- 2120T+3d: ICP2120 30mins@50C+RT 3d
- 2120 3d: ICP2120 RT 3d
- 2032s T: ABP2032s 1h@80C
- ICP2120 cured DCR all groups <5Ω, better than ABP2032s.

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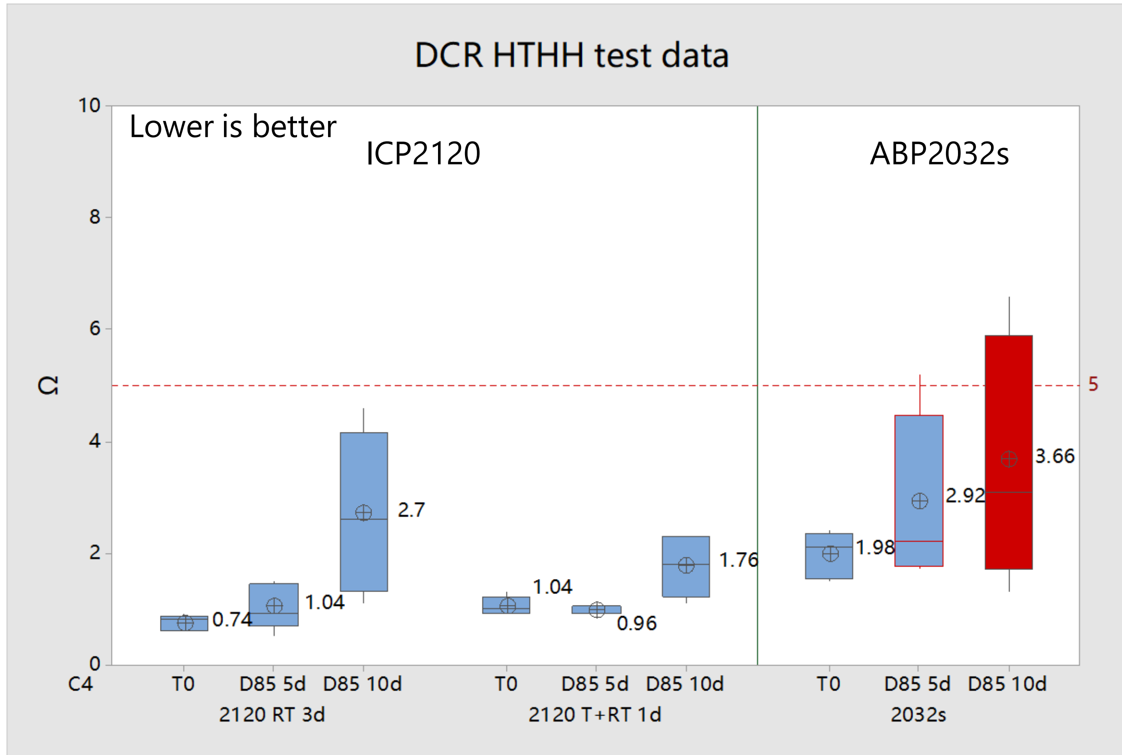
ADHESIVE DCR(DIRECTLY CONTACT RESISTANT) TEST

DCR DATA POST HTHH



Summary

- 2120 RT 3d: ICP2120 room temp 3days
- 2120T+RT 1d: ICP2120 30mins@50C+room temp 1d
- 2032s: ABP2032s 1h@80C
- Post HTHH 5/10days
  - ICP2120 DCR all groups <5Ω
  - ABP2032s DCR data turns worse(>5Ω) from 5days.

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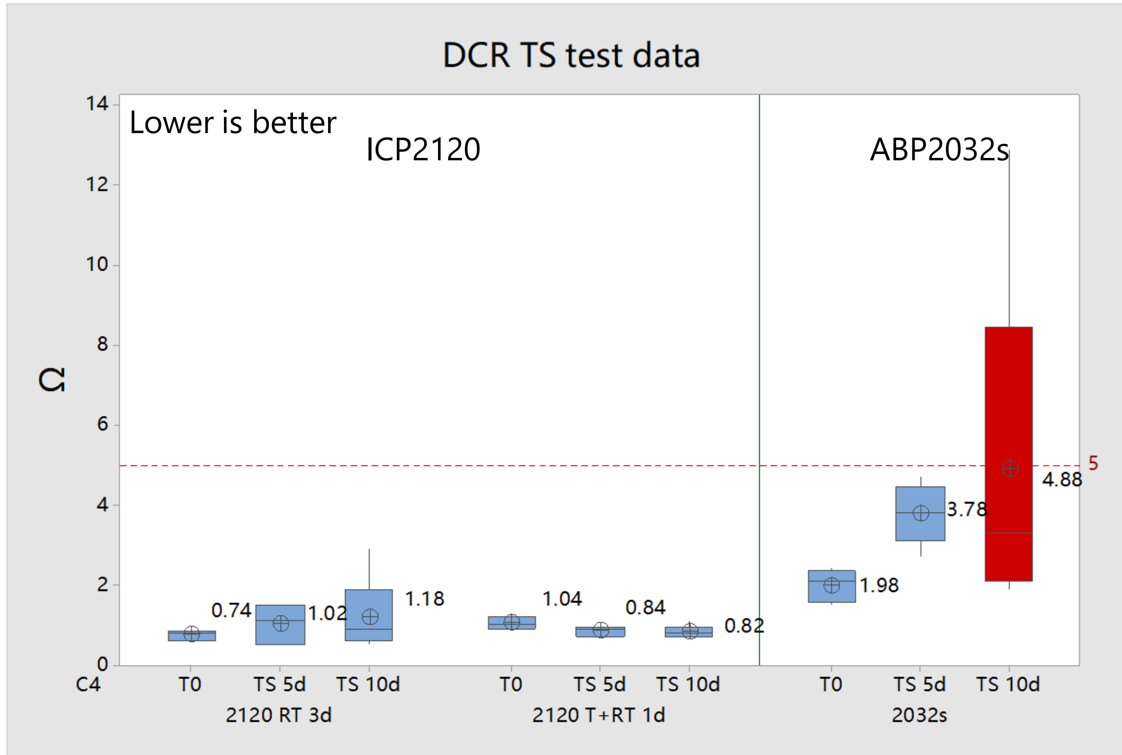
ADHESIVE DCR(DIRECTLY CONTACT RESISTANT) TEST

DCR DATA POST TS



Summary

- 2120 RT 3d: ICP2120 room temp 3days
- 2120T+RT 1d: ICP2120 30mins@50C+room temp 1d
- 2032s: ABP2032s 1h@80C
- Post TS 5/10days,
  - ICP2120 DCR all groups <5Ω,
  - ABP2032s DCR data turns worse(>5Ω) from 10days.

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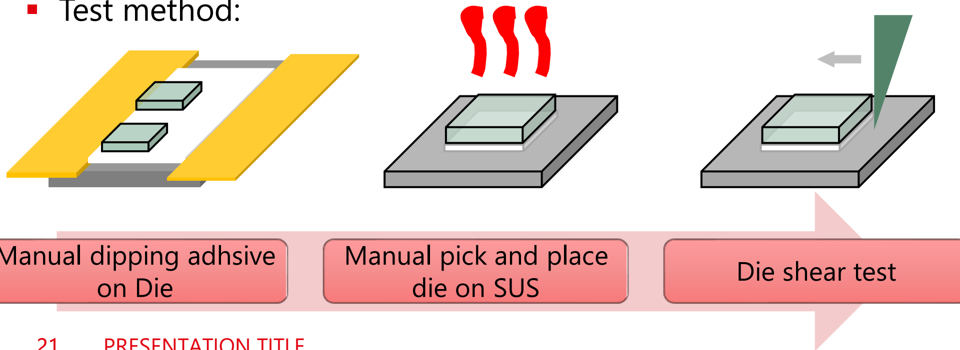
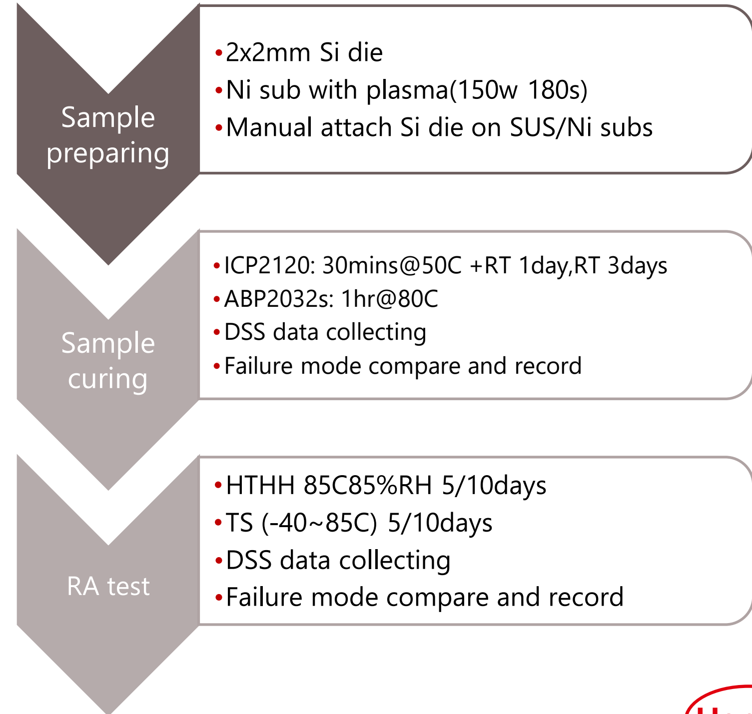
ADHESION PERFORMANCE
TEST ENVIRONMENT

Test parameter:

- Die size: 2*2mm Si die(370um thickness)
- Substrate: SUS/Ni, Ni with plasma
- Adhesive: ICP2120, ABP2032s
- Test data: Adhesion with different profiles and failure modes
- Curing profiles: ICP 2120(30mins@50C +RT 1day, RT 3days), ABP2032s(1h@80C)
- RA test: HTHH 85C85%RH 5/10days, TS (-40~85C) 5/10days
- Test method:



Test flow:



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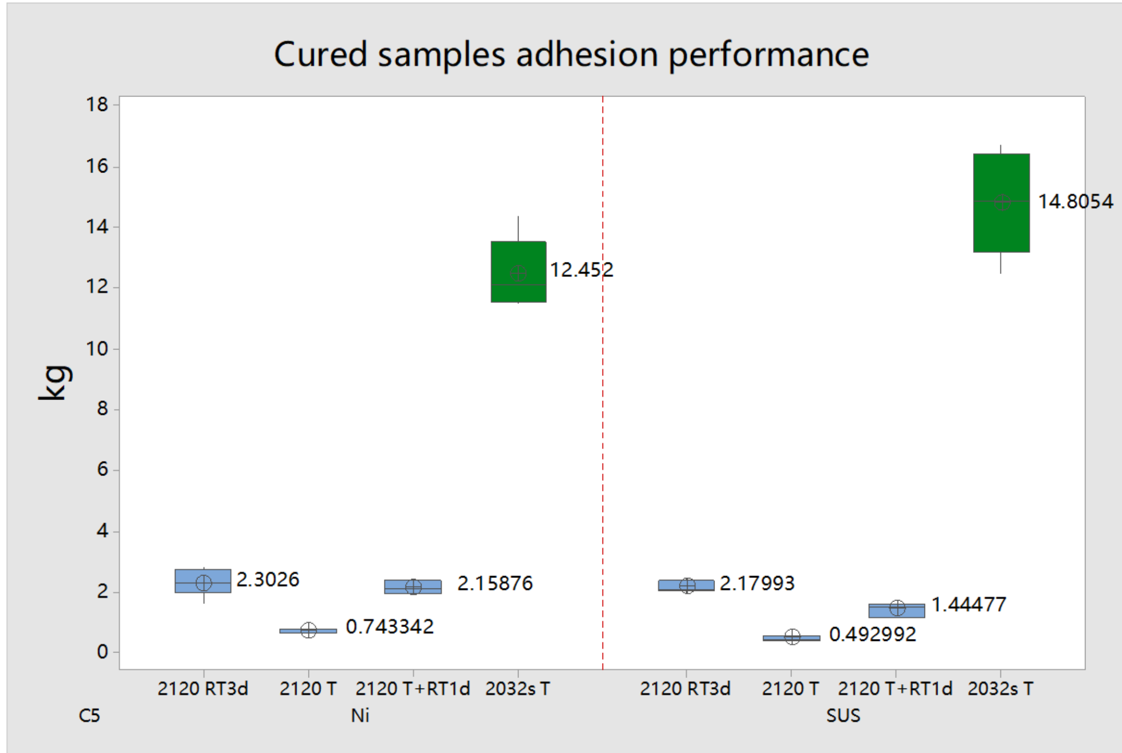
ADHESION PERFORMANCE
CURED SAMPLES ADHESION



Summary

- 2120 RT 3d: ICP2120 room temp 3days
- 2120T: ICP2120 30mins@50C
- 2120T+RT 1d: ICP2120 30mins@50C+room temp 1d
- 2032s T: ABP2032s 1h@80C
- ICP2120 on SUS/Ni subs,
  - Cured with thermal only is lower adhesion than other groups
  - Perform better adhesion on Ni subs
- ABP2032s is higher adhesion than ICP2120 on both subs.

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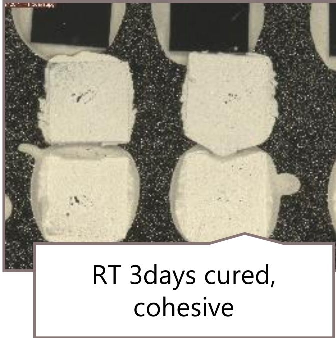
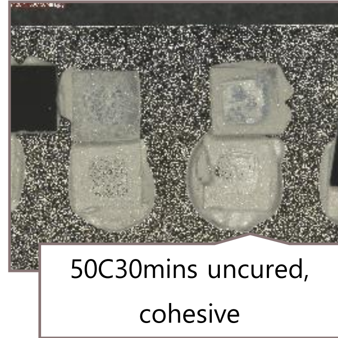
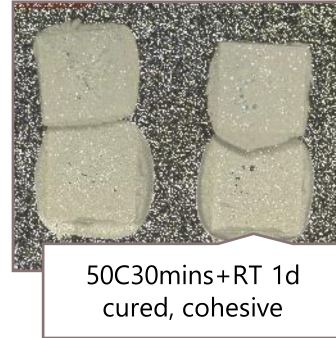
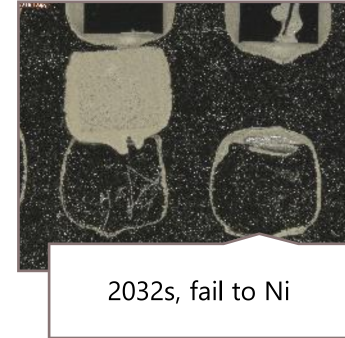
ADHESION PERFORMANCE
FAILURE MODE POST T0

- Ni surface failure mode

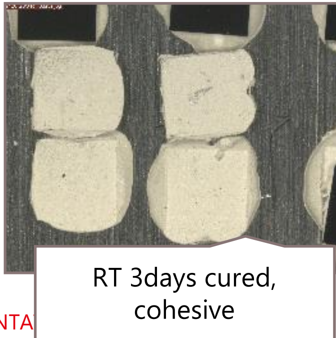

RT 3days cured, cohesive

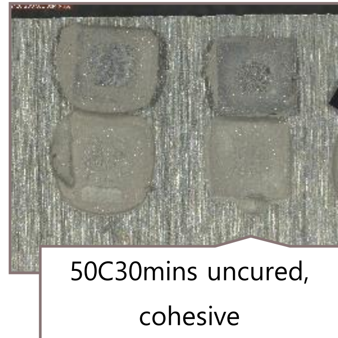

50C30mins uncured, cohesive

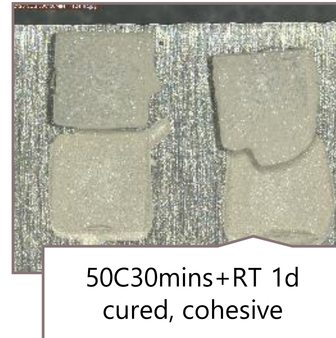

50C30mins+RT 1d cured, cohesive

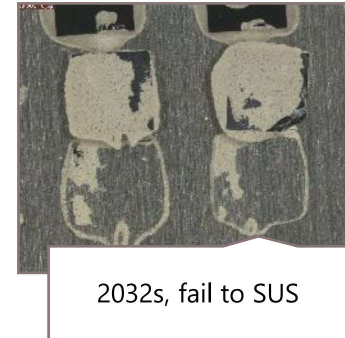

2032s, fail to Ni

- SUS surface failure mode


RT 3days cured, cohesive


50C30mins uncured, cohesive


50C30mins+RT 1d cured, cohesive


2032s, fail to SUS

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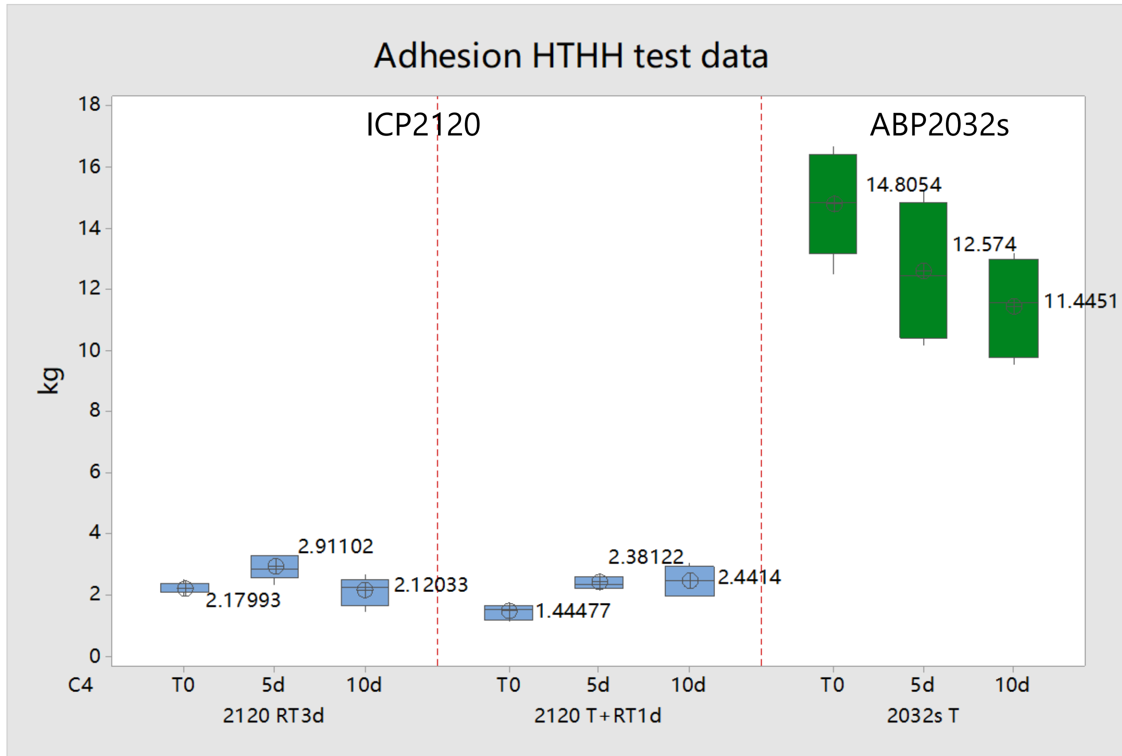
ADHESION PERFORMANCE
DSS DATA POST HTHH- SUS SUBSTRATE



Summary

- 2120 RT 3d: ICP2120 room temp 3days
- 2120T+RT 1d: ICP2120 30mins@50C+room temp 1d
- 2032s: ABP2032s 1h@80C
- Post HTHH 5/10days
  - ICP2120 performs post cure phenomenon.
  - ABP2032s adhesion decreases 14% from T0-10days

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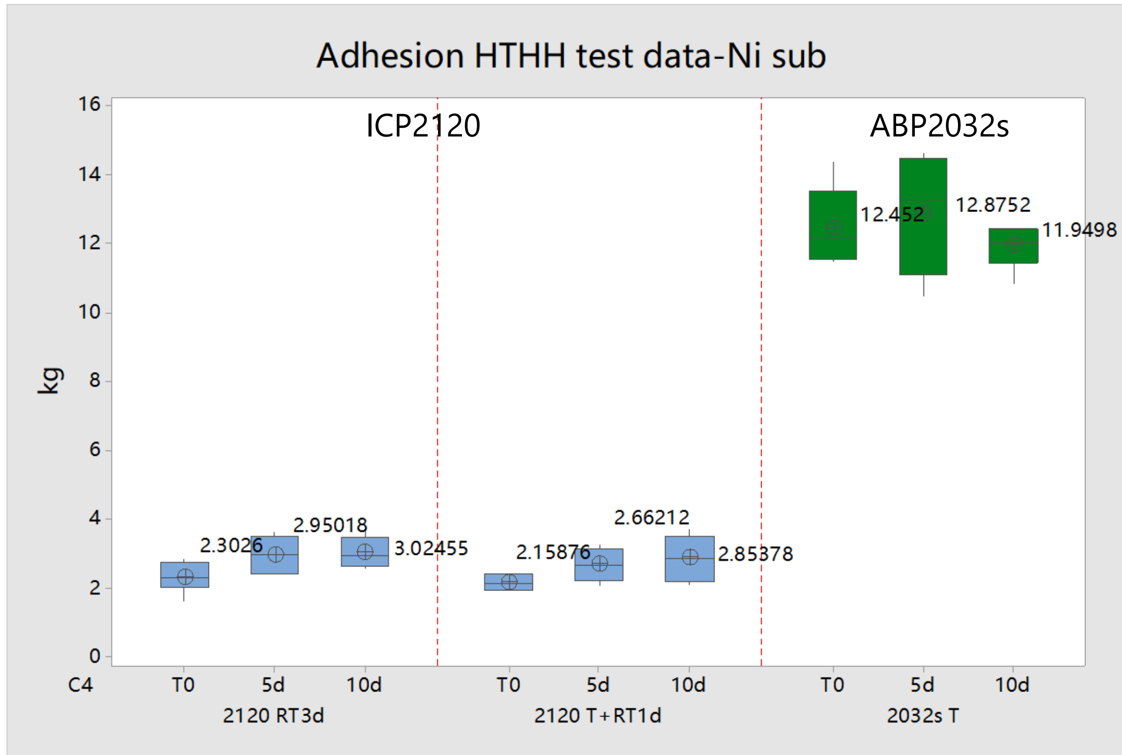
ADHESION PERFORMANCE
DSS DATA POST HTHH- NI SUBSTRATE



Summary

- 2120 RT 3d: ICP2120 room temp 3days
- 2120T+RT 1d: ICP2120 30mins@50C+room temp 1d
- 2032s: ABP2032s 1h@80C
- Post HTHH 5/10days
    - ICP2120 performs post cure phenomenon.
    - ABP2032s adhesion decreases 4% from T0-10days

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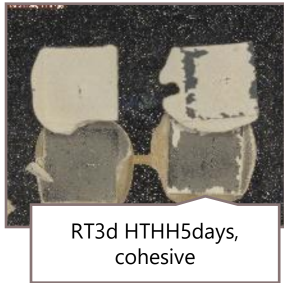
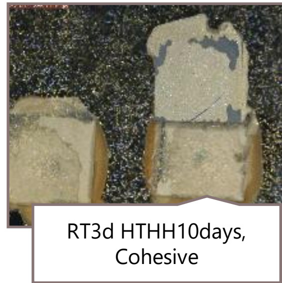
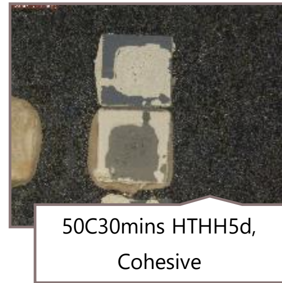
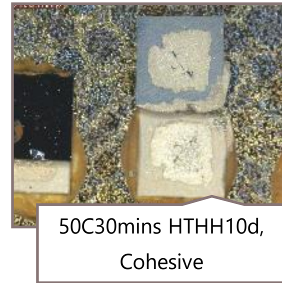
ADHESION PERFORMANCE
FAILURE MODE POST HTHH

- Ni surface failure mode

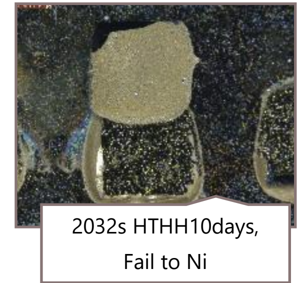

RT3d HTHH5days, cohesive


RT3d HTHH10days, Cohesive


50C30mins HTHH5d, Cohesive


50C30mins HTHH10d, Cohesive

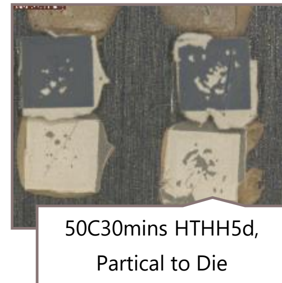
2032s HTHH5days, Fail to Ni

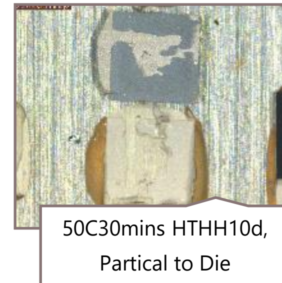

2032s HTHH10days, Fail to Ni

- SUS surface failure mode

RT3d HTHH5days, cohesive

RT3d HTHH10days, Partical to Die


50C30mins HTHH5d, Partical to Die


50C30mins HTHH10d, Partical to Die

2032s HTHH5days, Fail to SUS

2032s HTHH 10days, Fail to SUS

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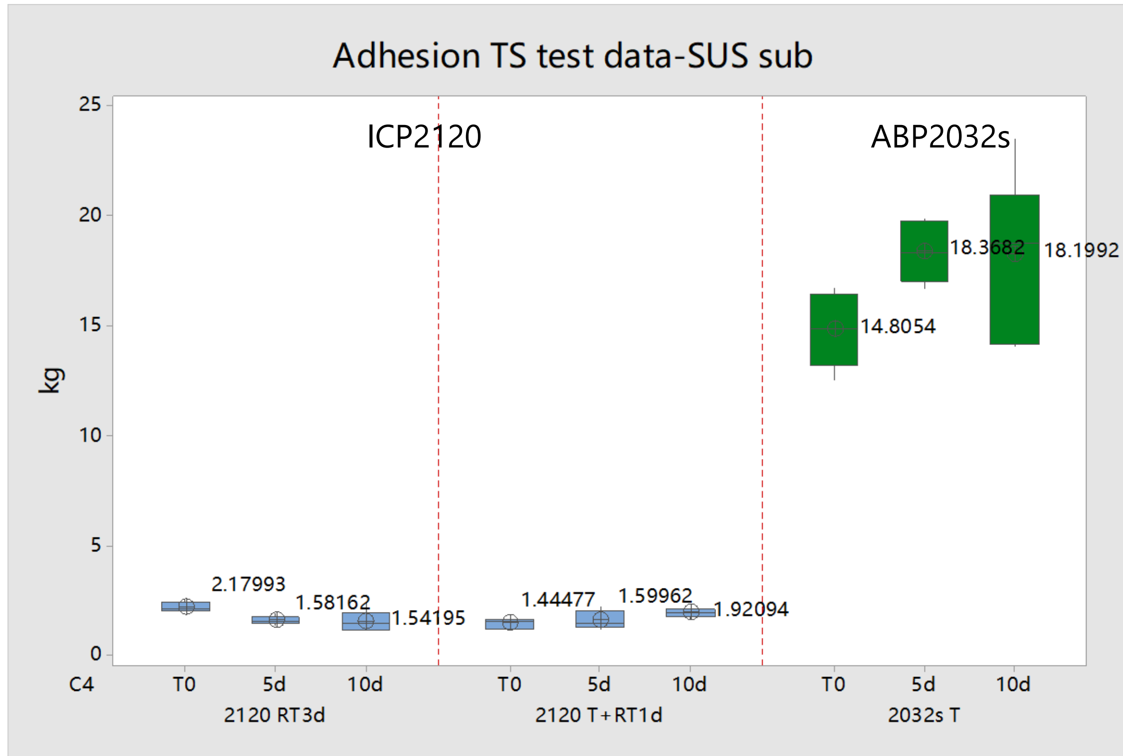
ADHESION PERFORMANCE
DSS DATA POST TS- SUS SUBSTRATE



Summary

- 2120 RT 3d: ICP2120 room temp 3days
- 2120T+RT 1d: ICP2120 30mins@50C+room temp 1d
- 2032s: ABP2032s 1h@80C
- Post TS 5/10days
    - ICP2120 RT3d performs adhesion attenuation and T+RT1d performs growth
    - ABP2032s adhesion grows 23% from T0-5days and keep stable.

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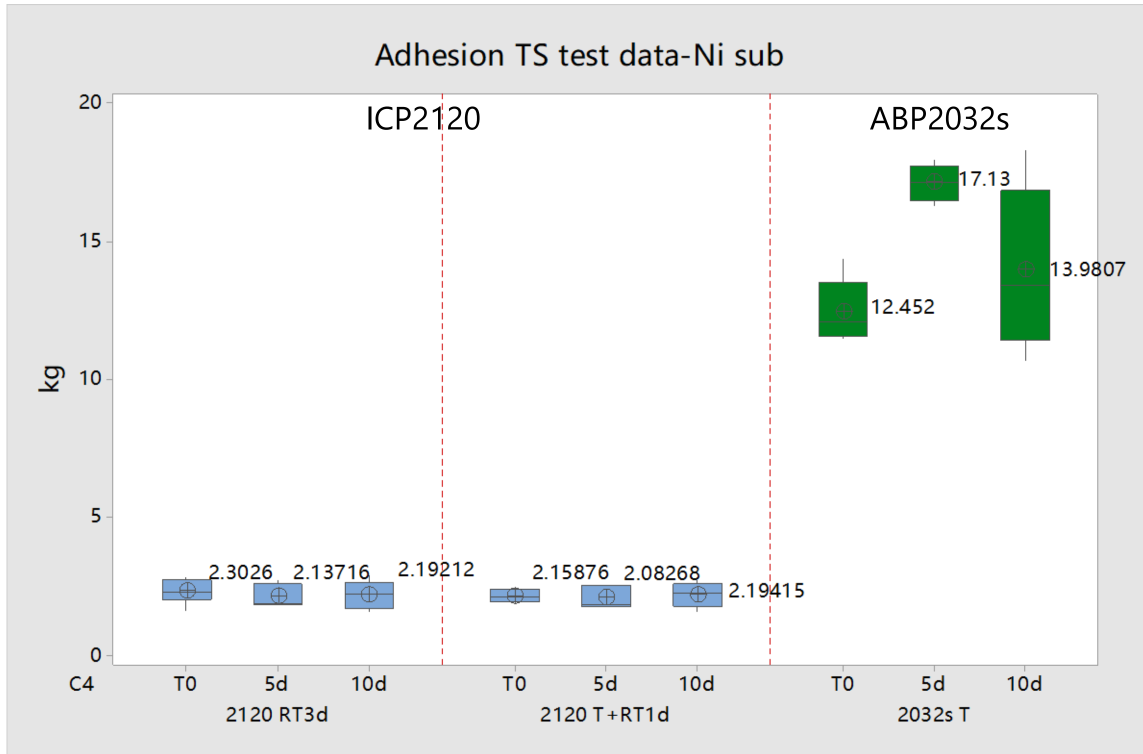
ADHESION PERFORMANCE
DSS DATA POST TS- NI SUBSTRATE



Summary

- 2120 RT 3d: ICP2120 room temp 3days
- 2120T+RT 1d: ICP2120 30mins@50C+room temp 1d
- 2032s: ABP2032s 1h@80C
- Post TS 5/10days
  - ICP2120 RT3d/T+RT1d performs adhesion stable
  - ABP2032s adhesion grows 38% from T0-5days and then drops 18%.

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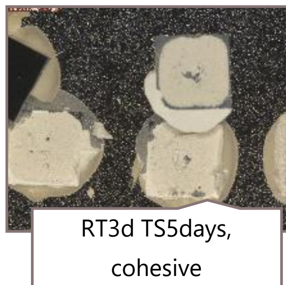
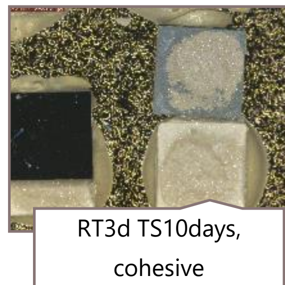
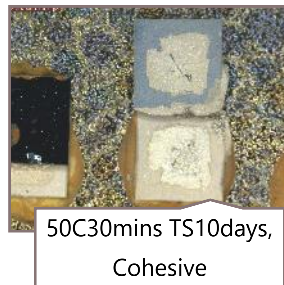
ADHESION PERFORMANCE
FAILURE MODE POST TS

- Ni surface failure mode

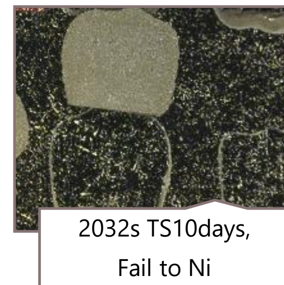

RT3d TS5days, cohesive


RT3d TS10days, cohesive

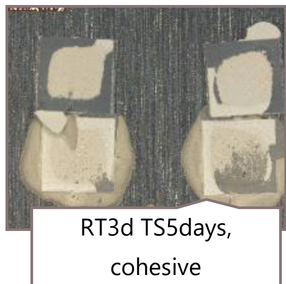
50C30mins TS5days, Cohesive

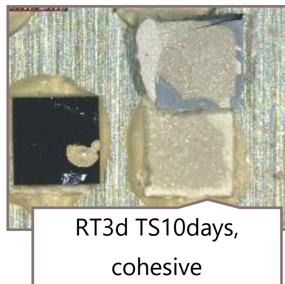

50C30mins TS10days, Cohesive

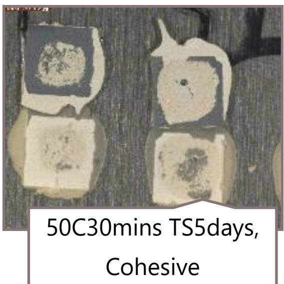
2032s TS5days, Fail to Ni


2032s TS10days, Fail to Ni

- SUS surface failure mode

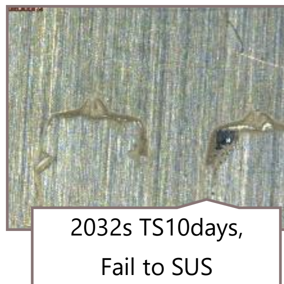

RT3d TS5days, cohesive


RT3d TS10days, cohesive


50C30mins TS5days, Cohesive

50C30mins TS10days, Fail to die

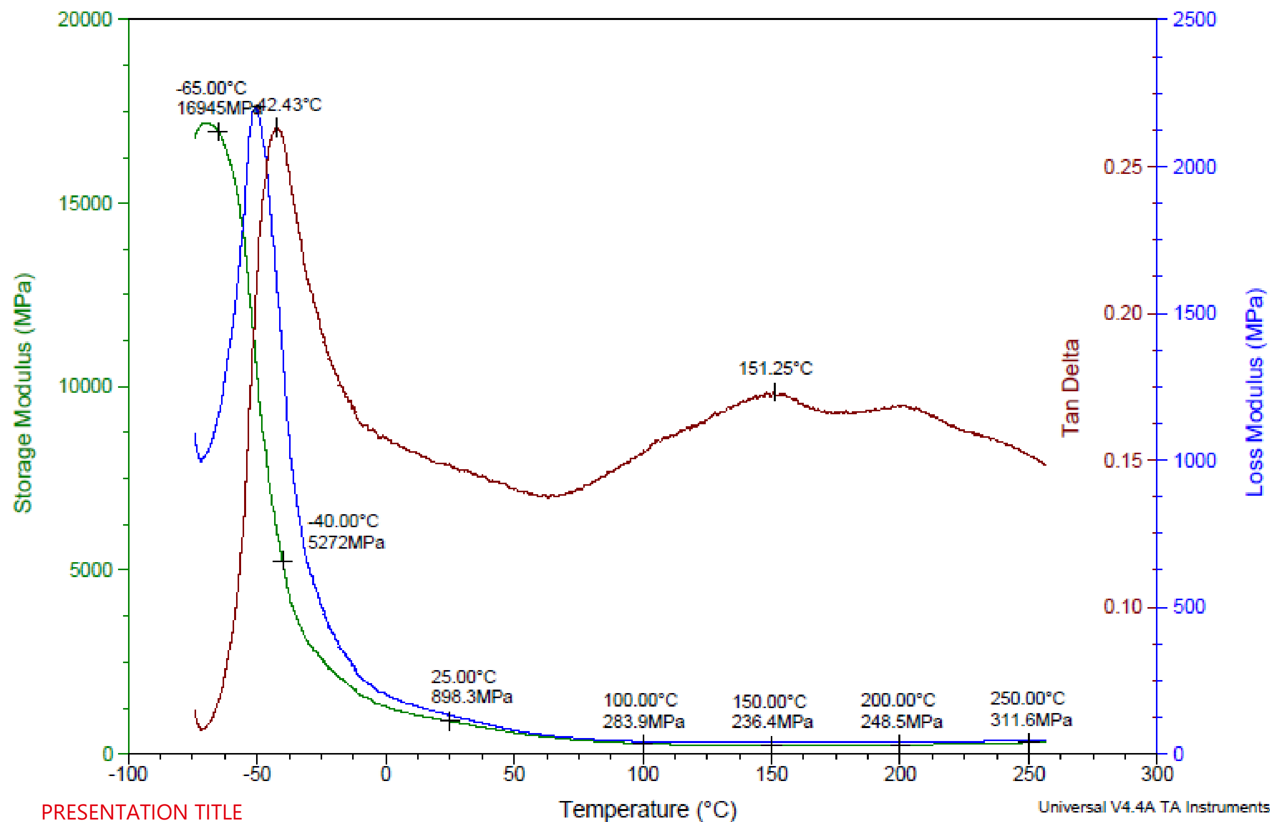
2032s TS5days, Fail to SUS


2032s TS10days, Fail to SUS

APPENDIX

DMA PROFILE

CURING WITH RT 7DAYS



Henkel

THANK YOU.

Henkel