Zero outgassing and flux residue compatible underfill

John Yin, Mary Liu and Wusheng Yin, Ph.D

YINCAE

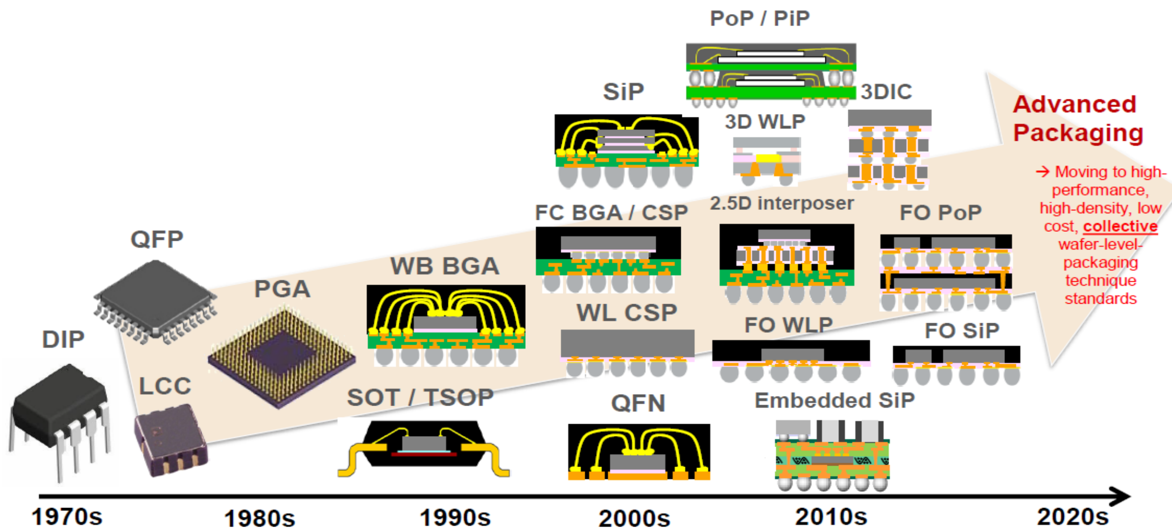
YINCAE Advanced Materials, LLC

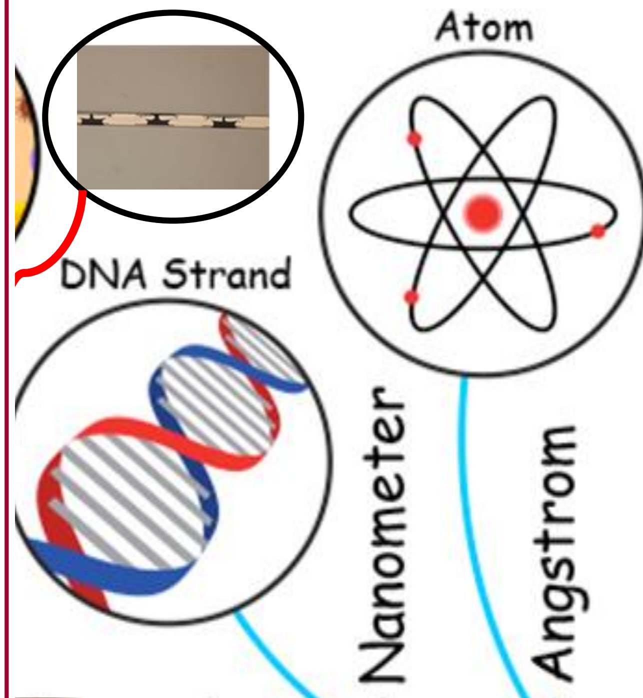
Outline

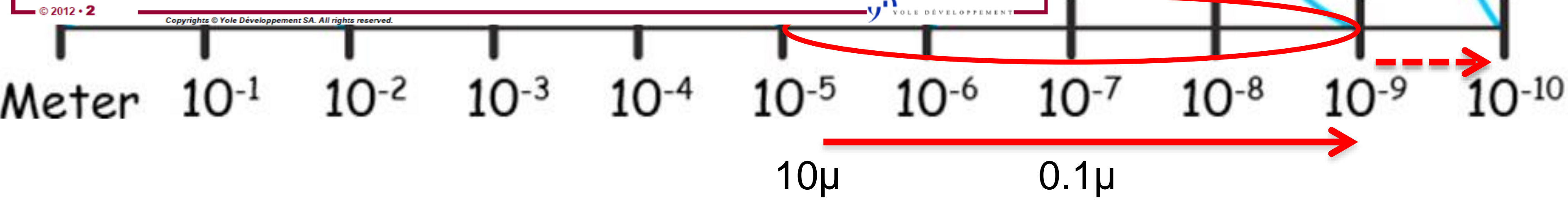
- Introduction
- Experiment
- Test and Reliability
- Discussion
- Conclusion

YINCAE

Miniaturization

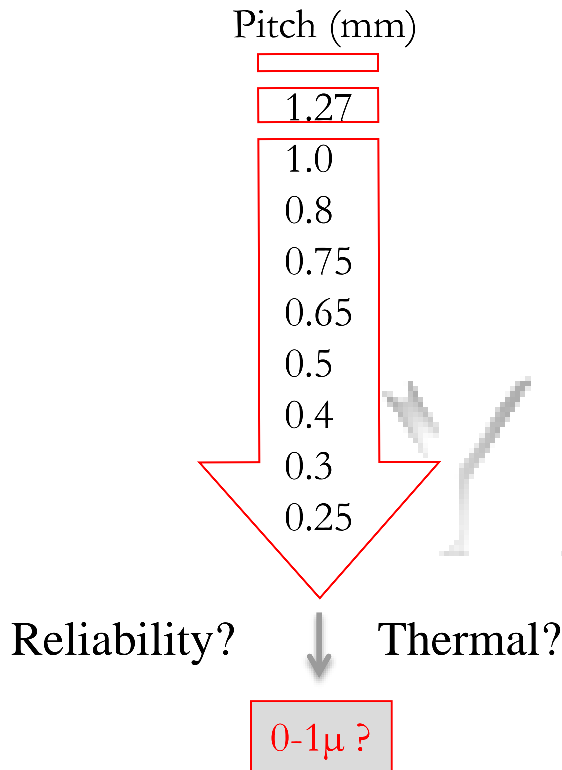






Confidential

Material's Challenging

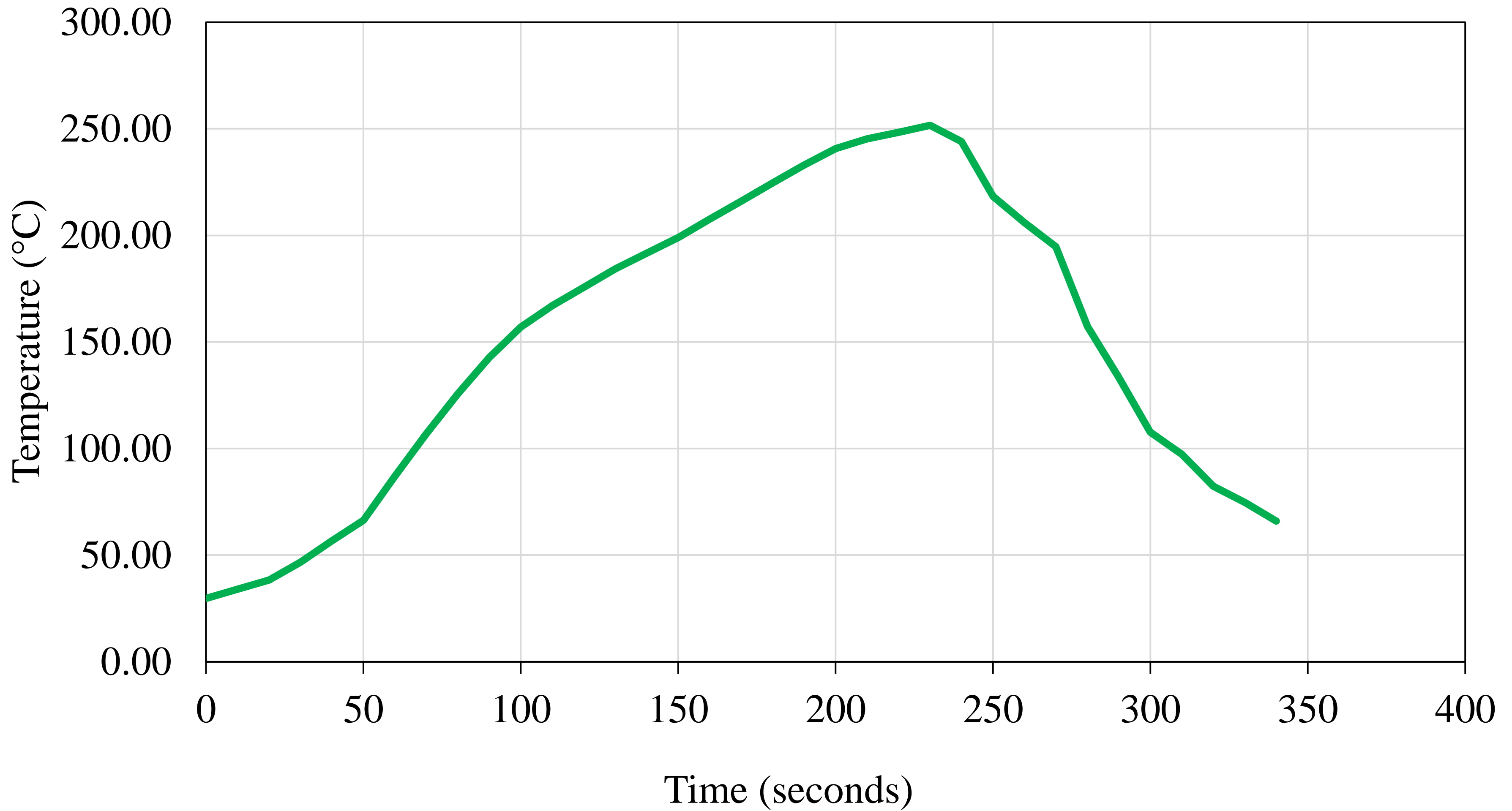


- Process Challenging:
  - a. Equipment tools
  - b. Assembly issue
  - c. Materials
    - Application Process
    - Warpage
    - Outgassing
    - Flux residue
- Reliability Challenging:

Experiments

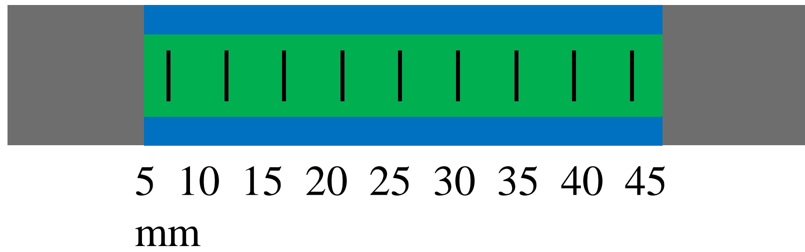
- Reflow Profile
- Flowability Test
- Weight Loss Test
- Flux Compatibility Test
- Reliability Test

Reflow Profile

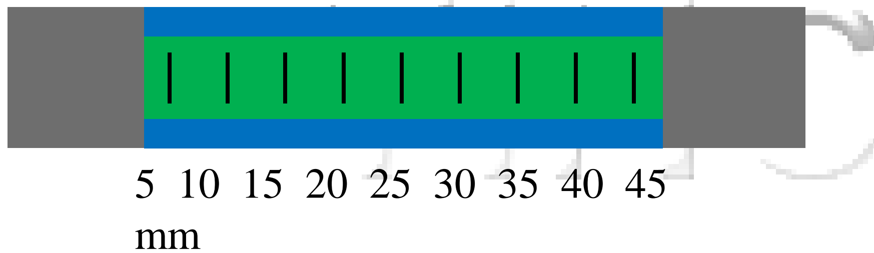


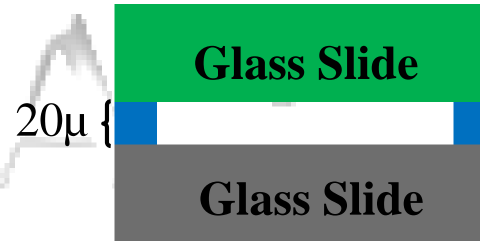
Flow Test Method

- Apparatus 1

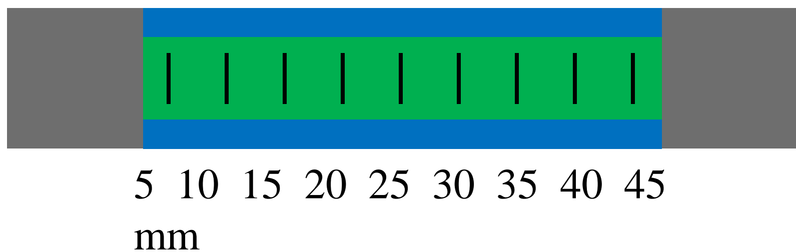


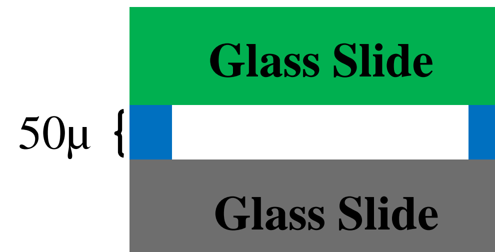
- Apparatus 2





- Apparatus 3





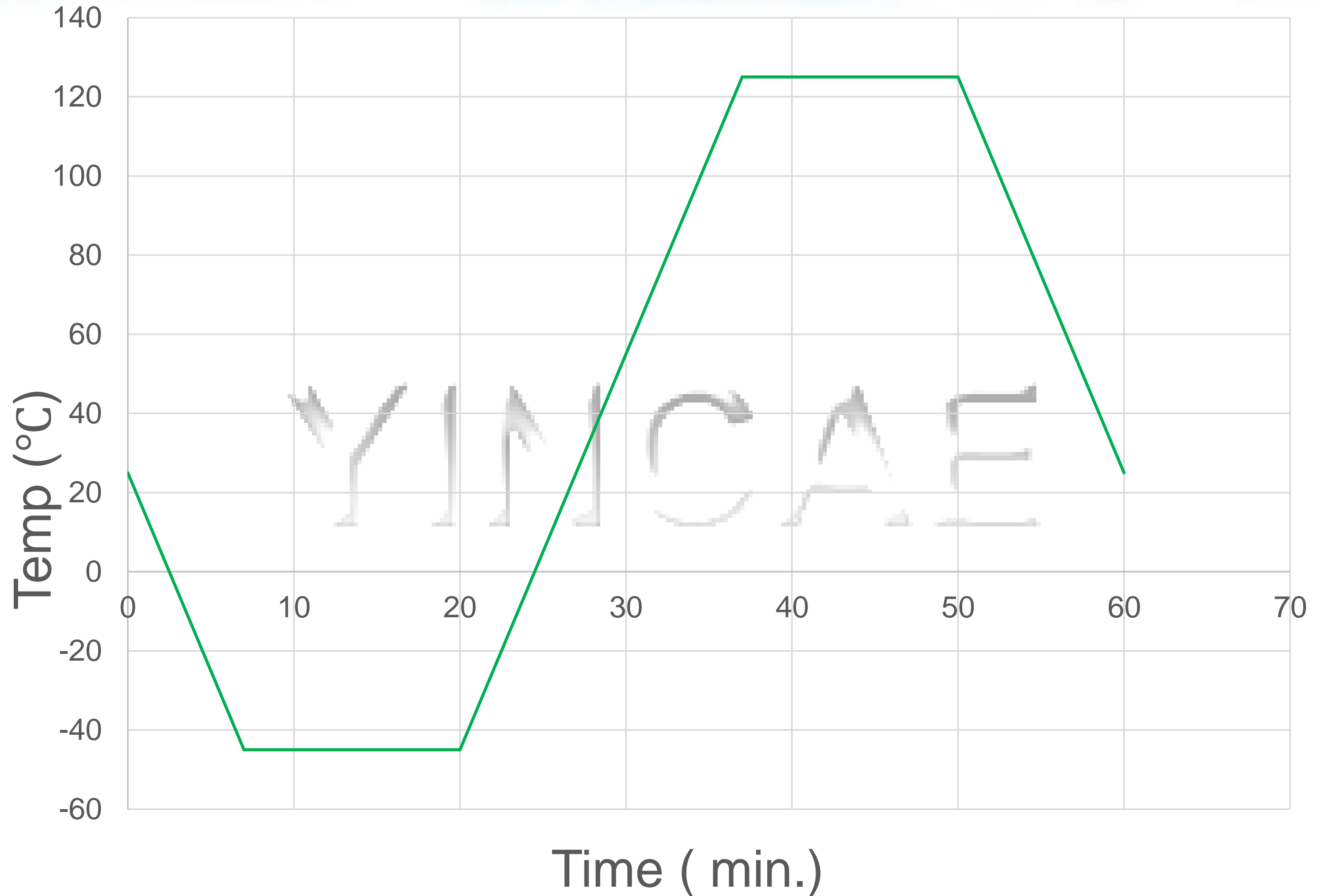
Weight Loss Measurement

- Clean glass slide and dry
- Dispense 0.2 g underfill onto glass slide
- Reflow the glass with underfill using lead free reflow process
- Weigh the cured underfill after reflow

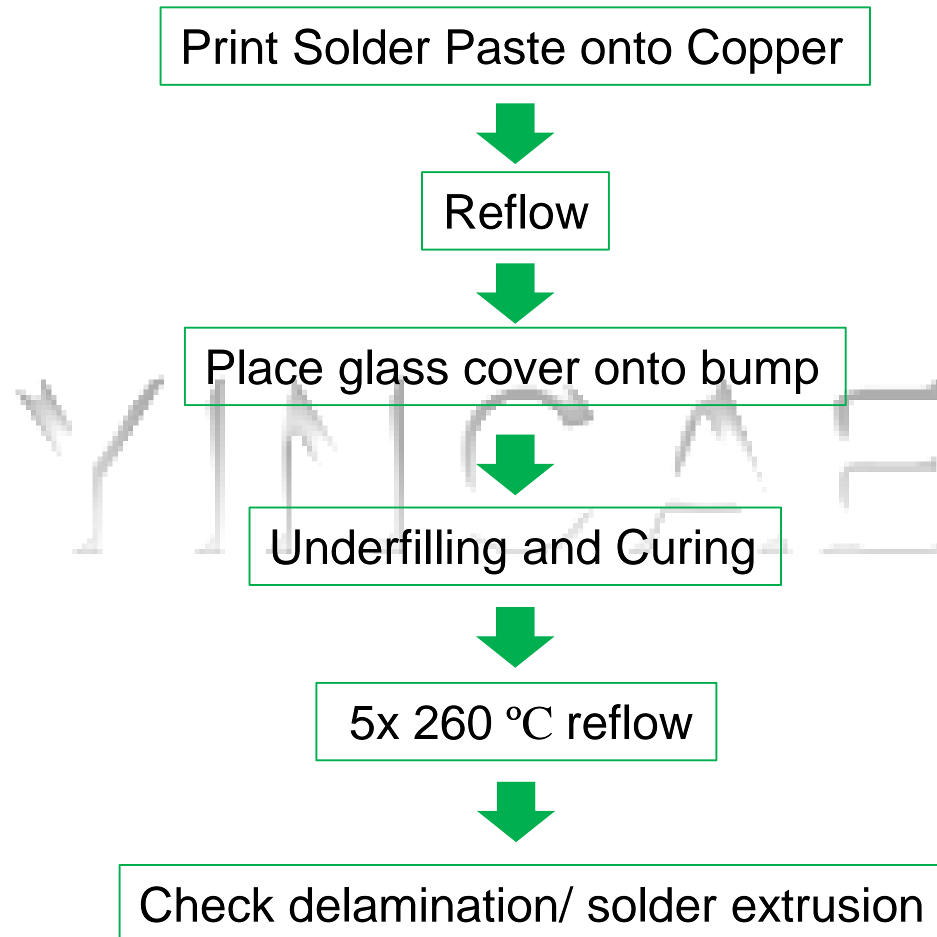
YINCAE

Confidential

Thermal Cycling Test



Flux Residue Compatibility Test



YINCAE® INNOVATION AT ITS BEST

Confidential

Test and Reliability

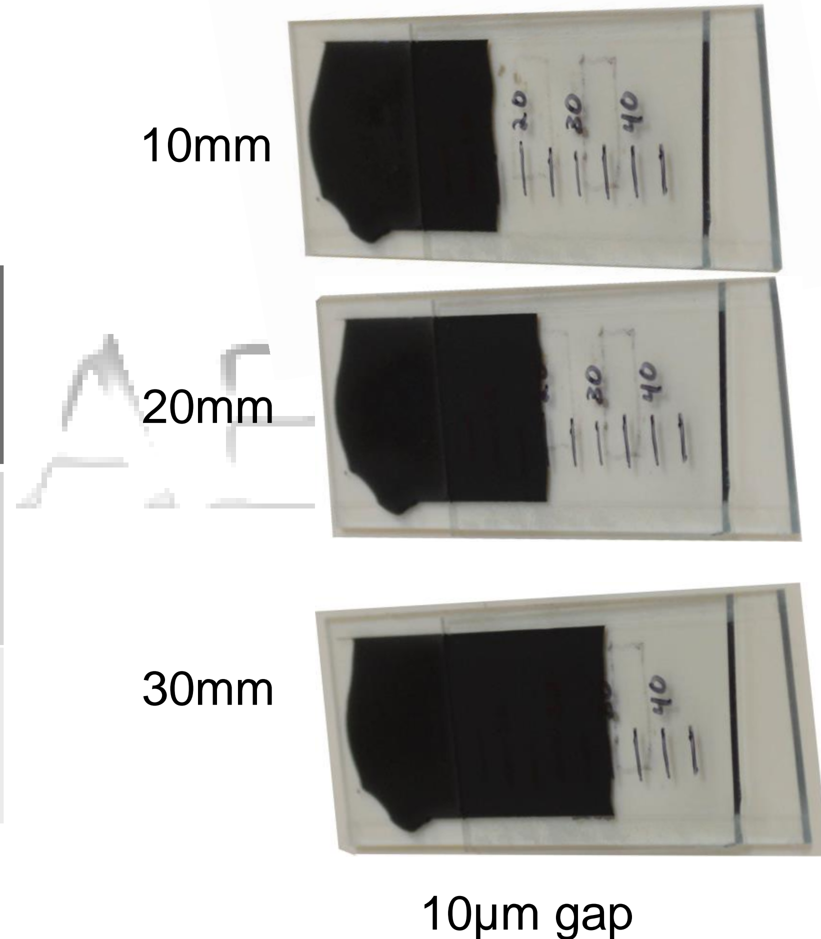
YINCAE

Fast Flow

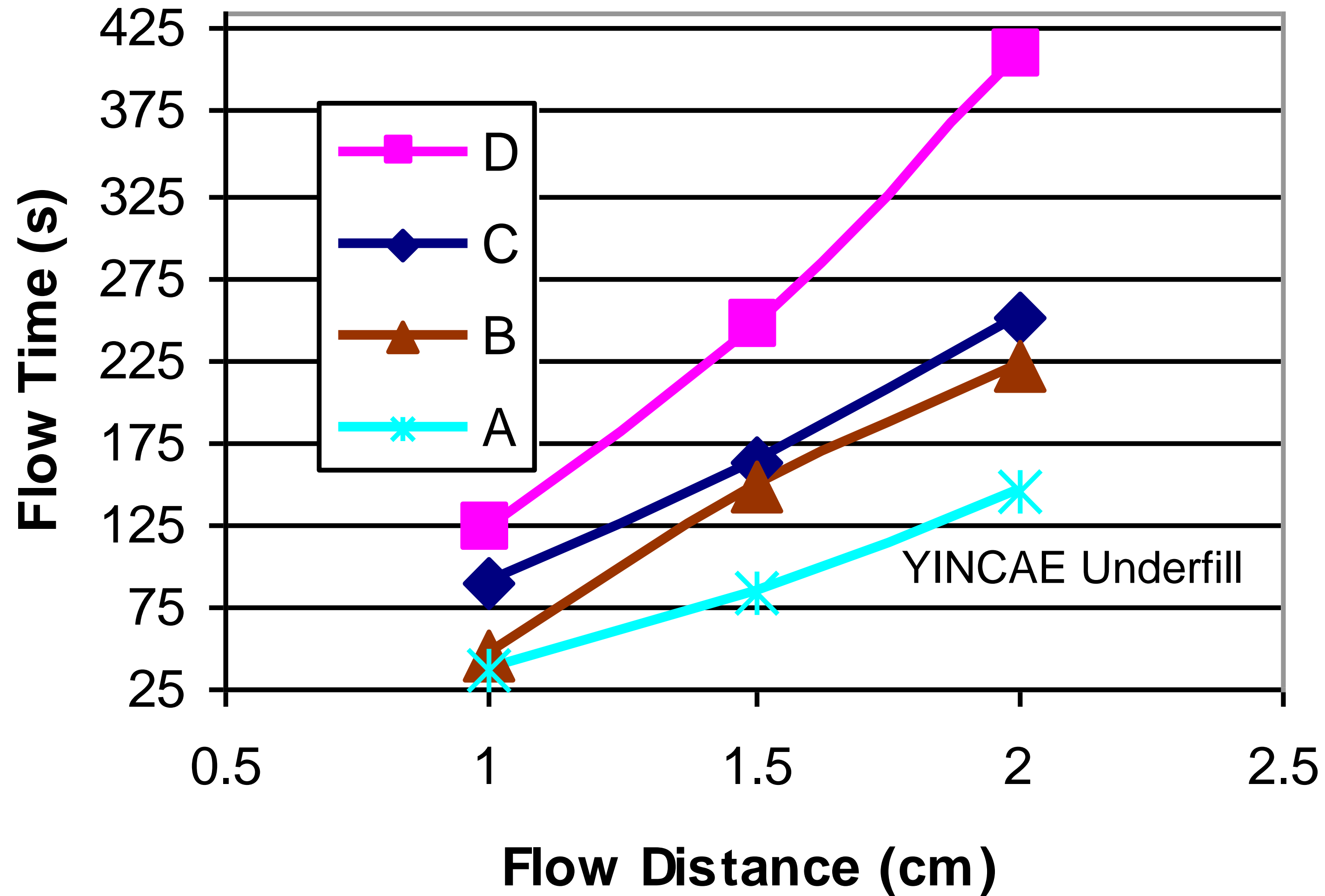
Good for small gap filling

Viscosity: 10-12Pa.s
0.062Pa.s @ 110ºC

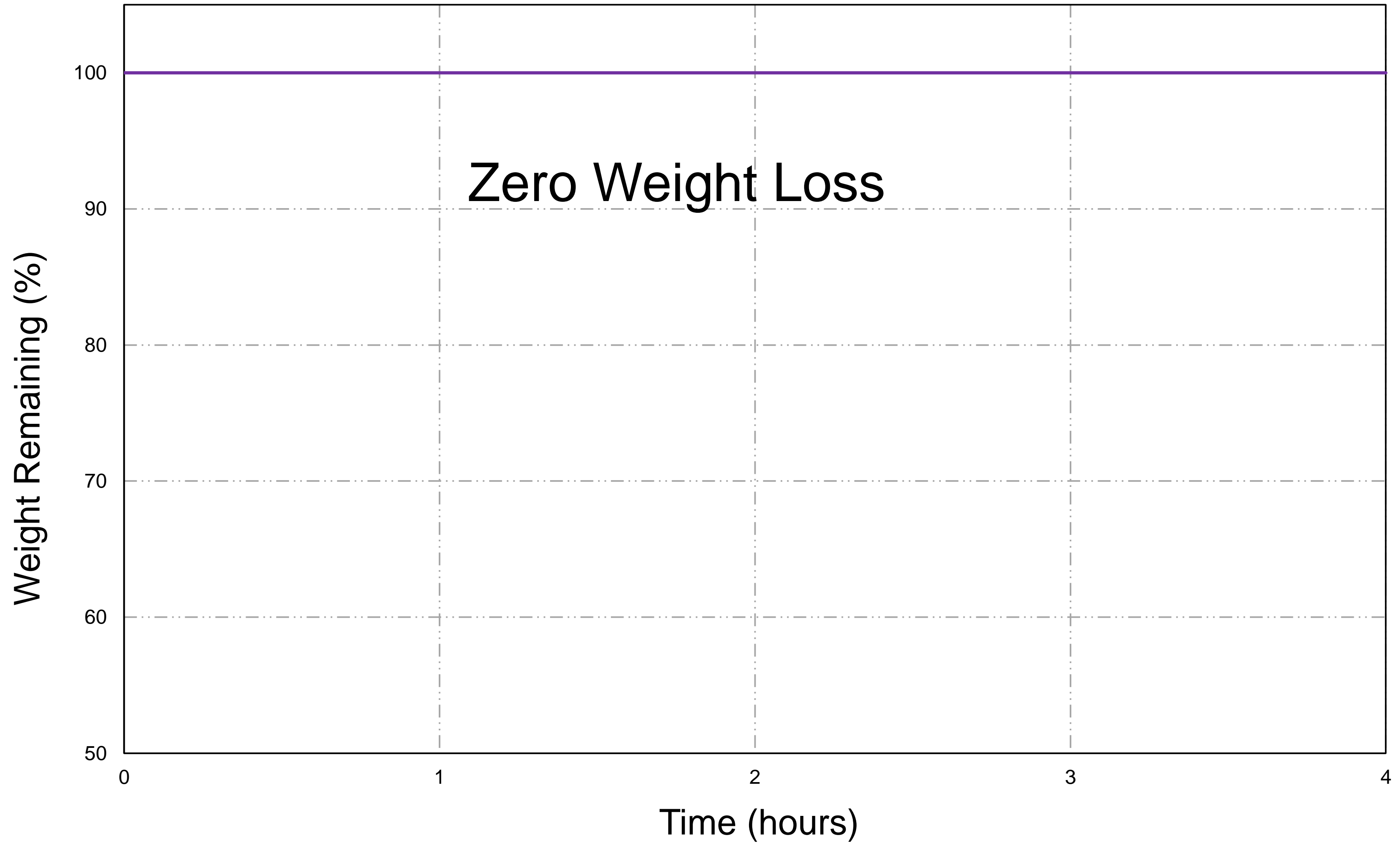
Gap (µm)	Distance (mm)	10	20	30
10	Flow time(s)	19	85	240
20	Flow time(s)	14	70	186



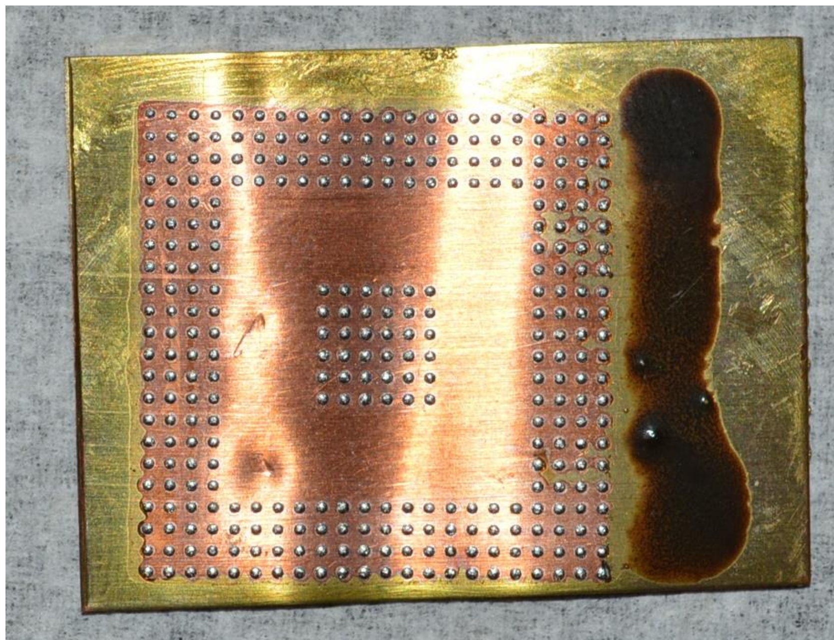
Flowability Comparison



Weight Loss

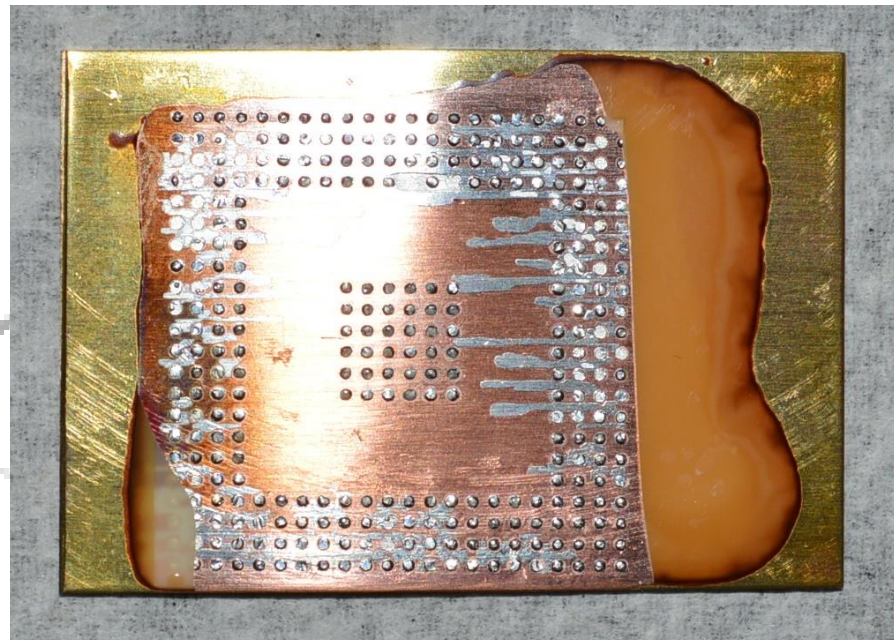


5x 260 ºC Reflow Testing



YINCAE Underfill

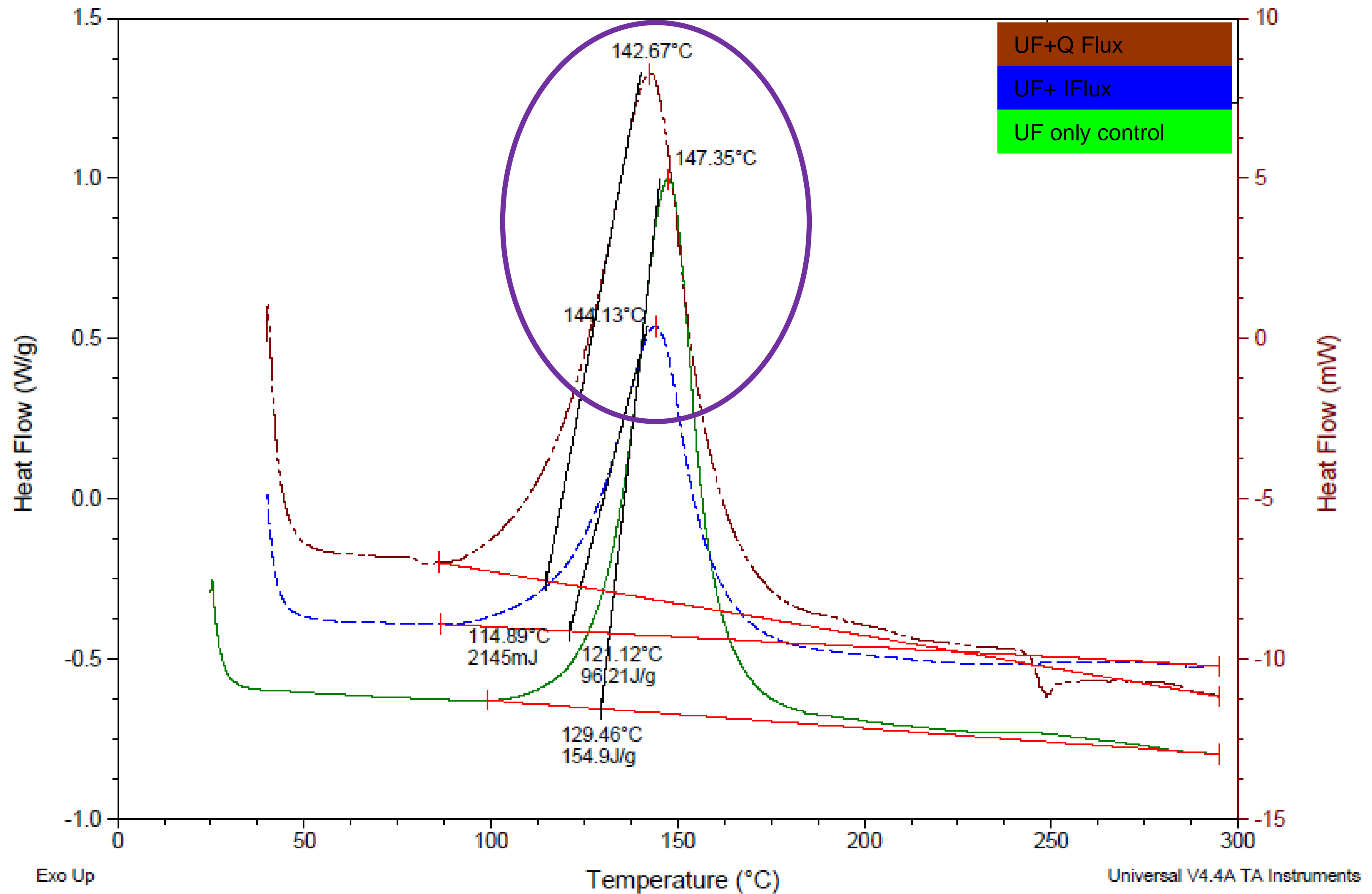
No delamination and solder extrusion



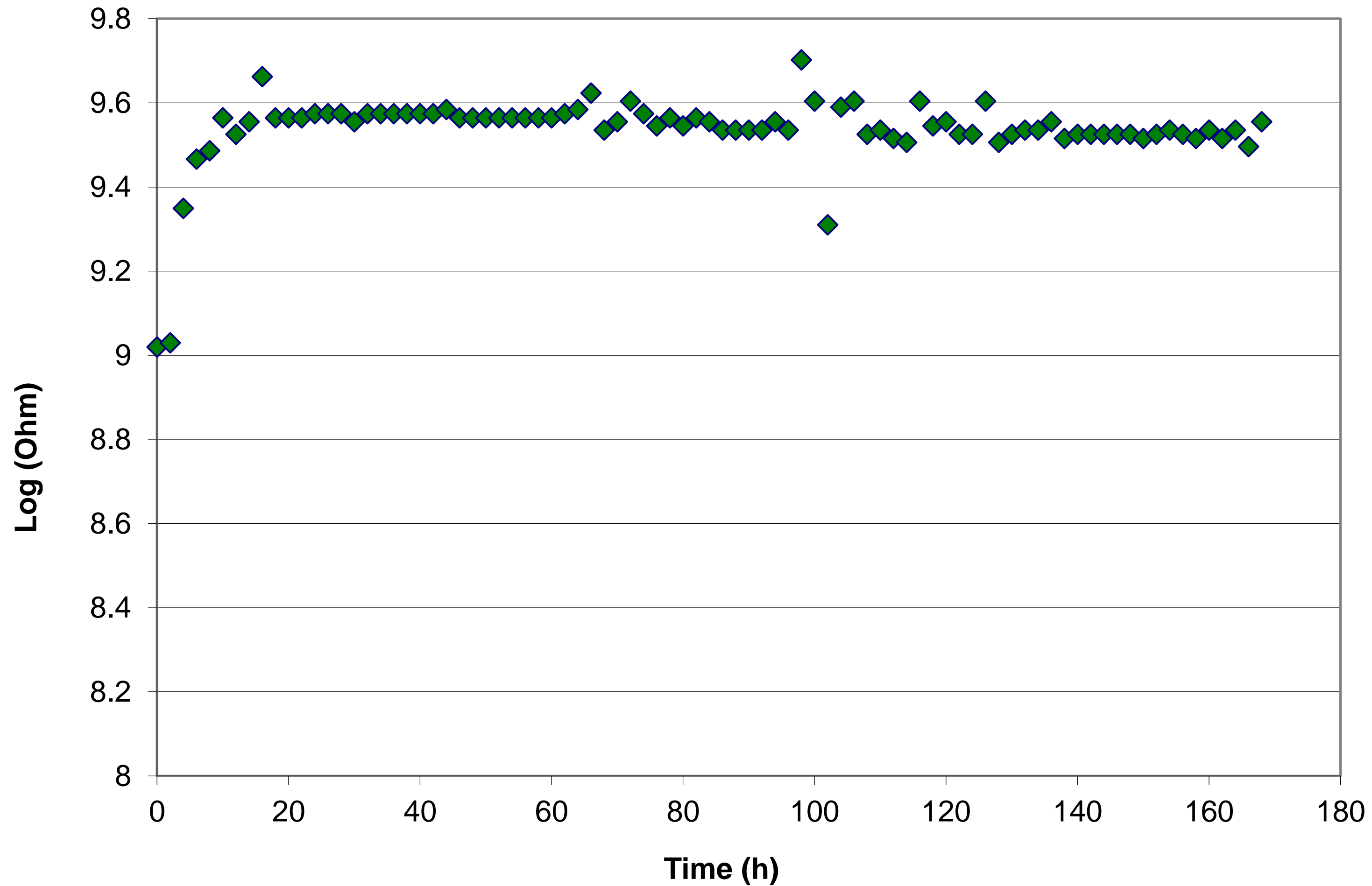
“ C” underfill

Delamination and Solder Extrusion

Compatibility With Flux

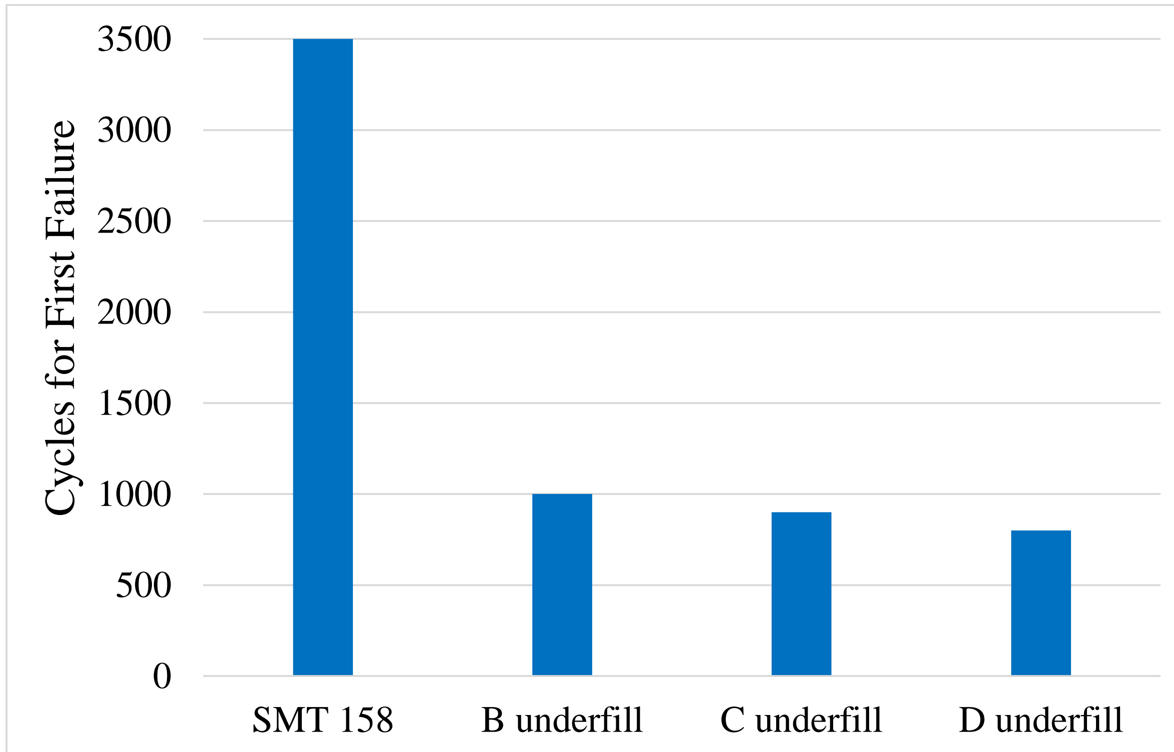


SIR Test



Temperature/RH: 85C/ 85 %

Thermal Cycling Performance



Thermal cycling conditions:
-45 ° C ~ 125 ° C;
One hour per cycle.

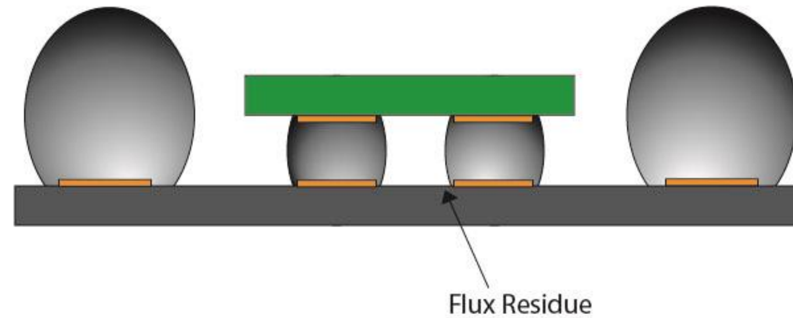
Underfill thermal cycling performance from best to worst:

YINCAE Underfill
B underfill
C underfill
D underfill

YINCAE Underfill: Tg 160-200 ºC , CTE 22ppm/K

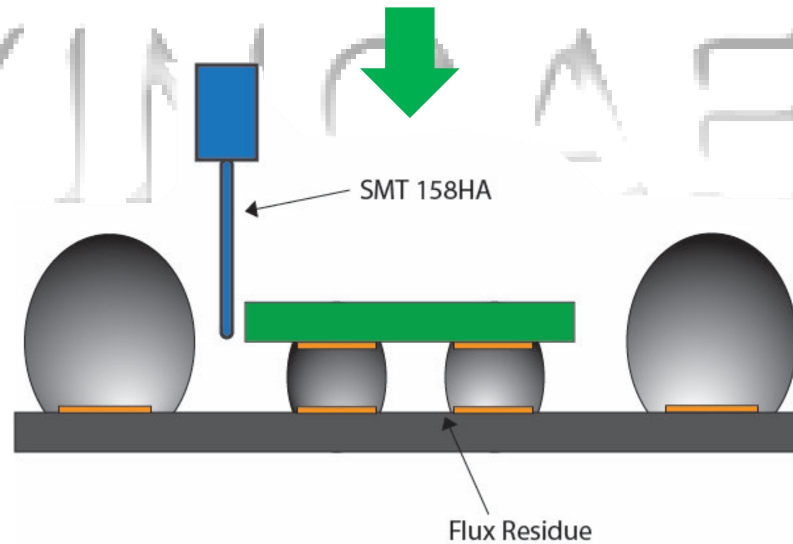
Confidential

Discussion



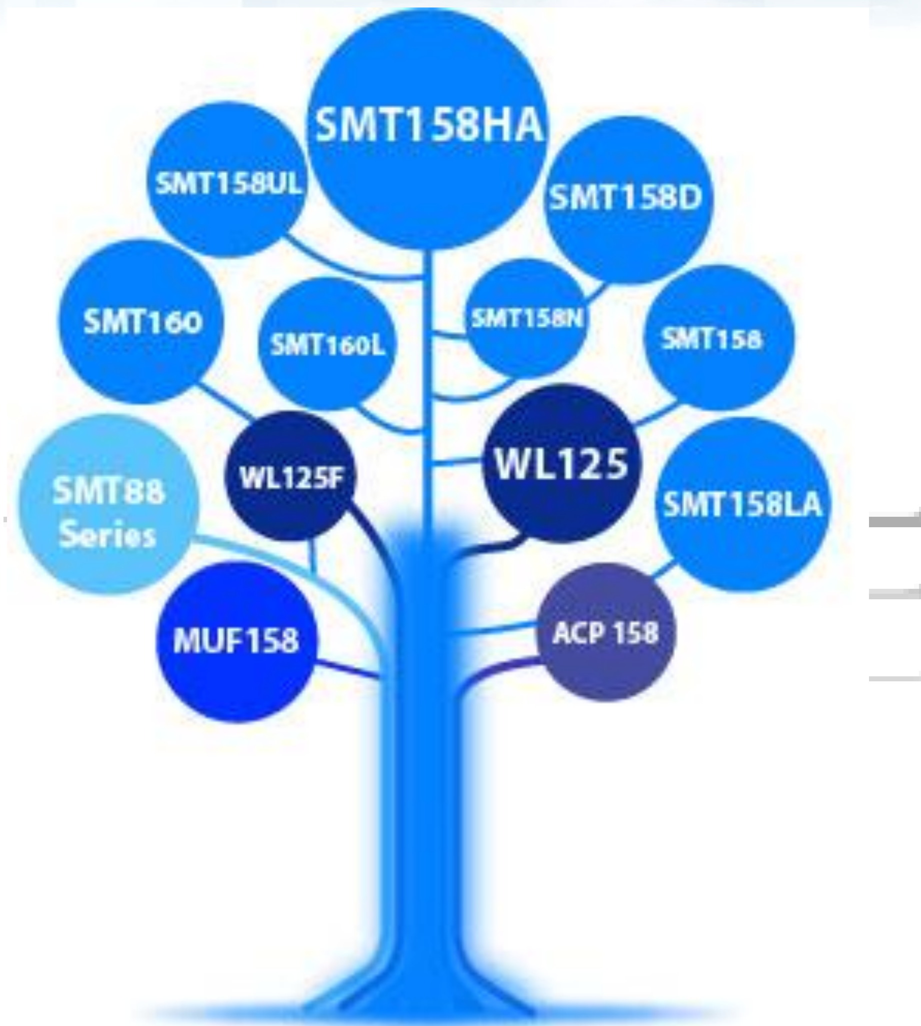
Any Issues?

YINCAE Solutions



Simplified underfilling process in wafer-level

YINCAE Underfill Solutions



Conclusion

- YINCAE has successfully developed a unique zero outgassing flux compatible underfill with high Tg and low CTE. The benefits are:
    - Eliminates the need for plasma cleaning
    - Fully compatible with all flux residues
    - Withstands up to 5x 260 ºC reflow

YINCAE

Thank you

Please come to visit our booth with any questions

YINCAE