TWENTY-SEVENTH ANNUAL

# TestConX™

# Archive

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# A new pogo pin plunger material
## : Enhancement of shortened material life caused by solder reactivity

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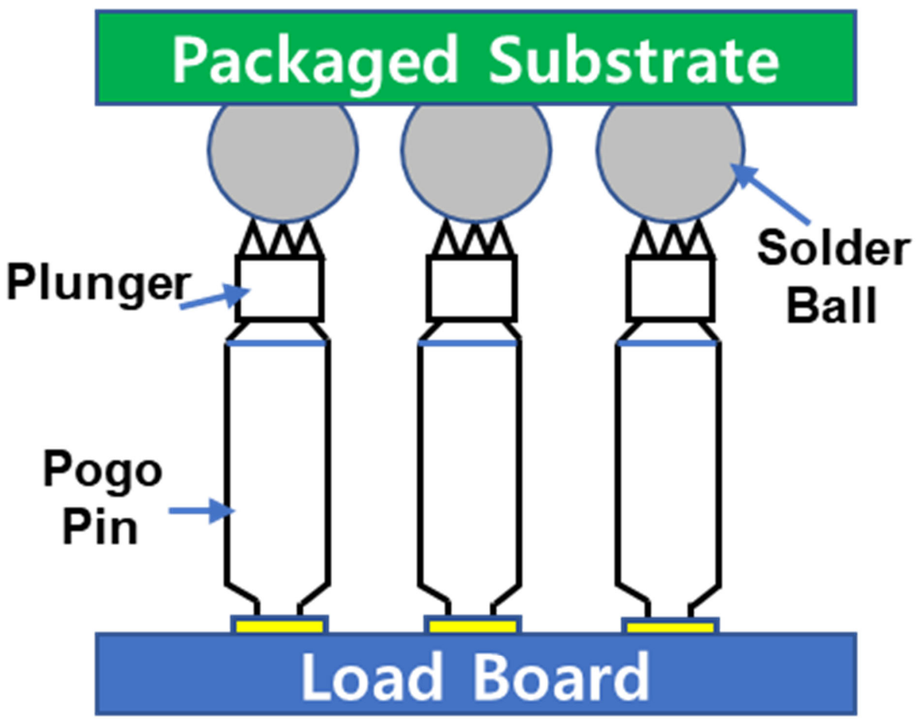
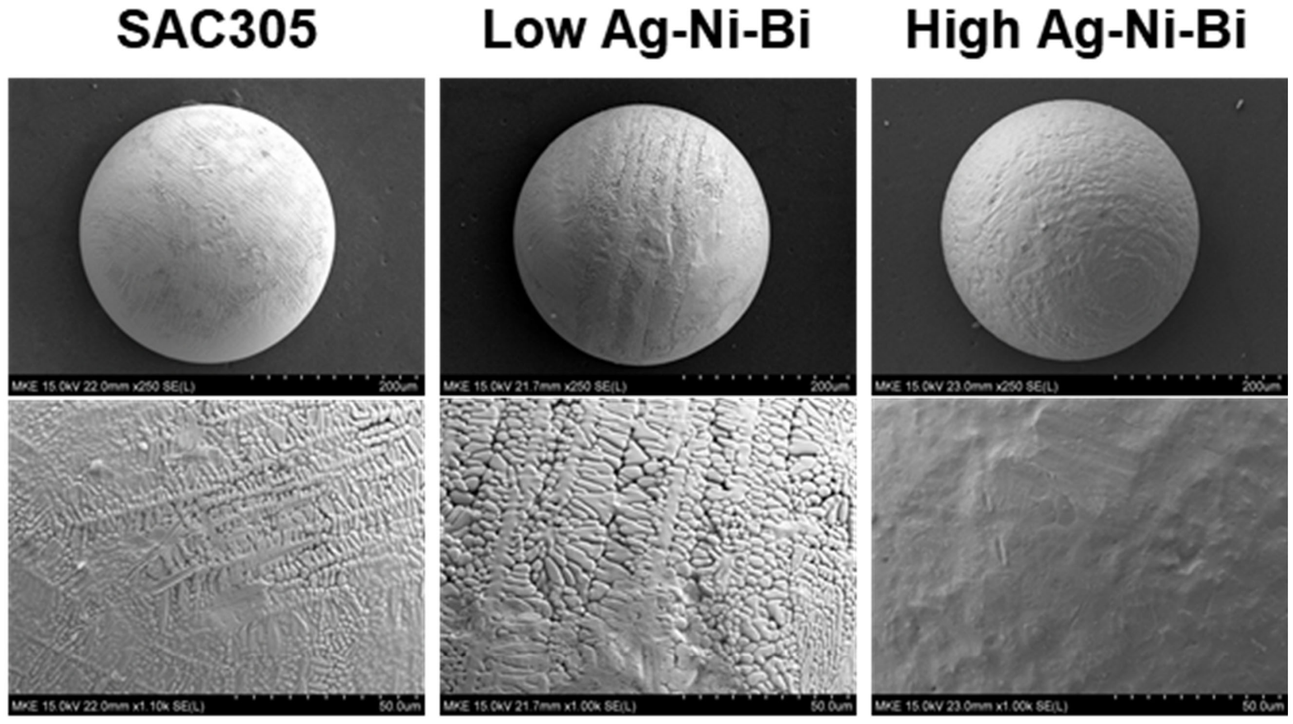
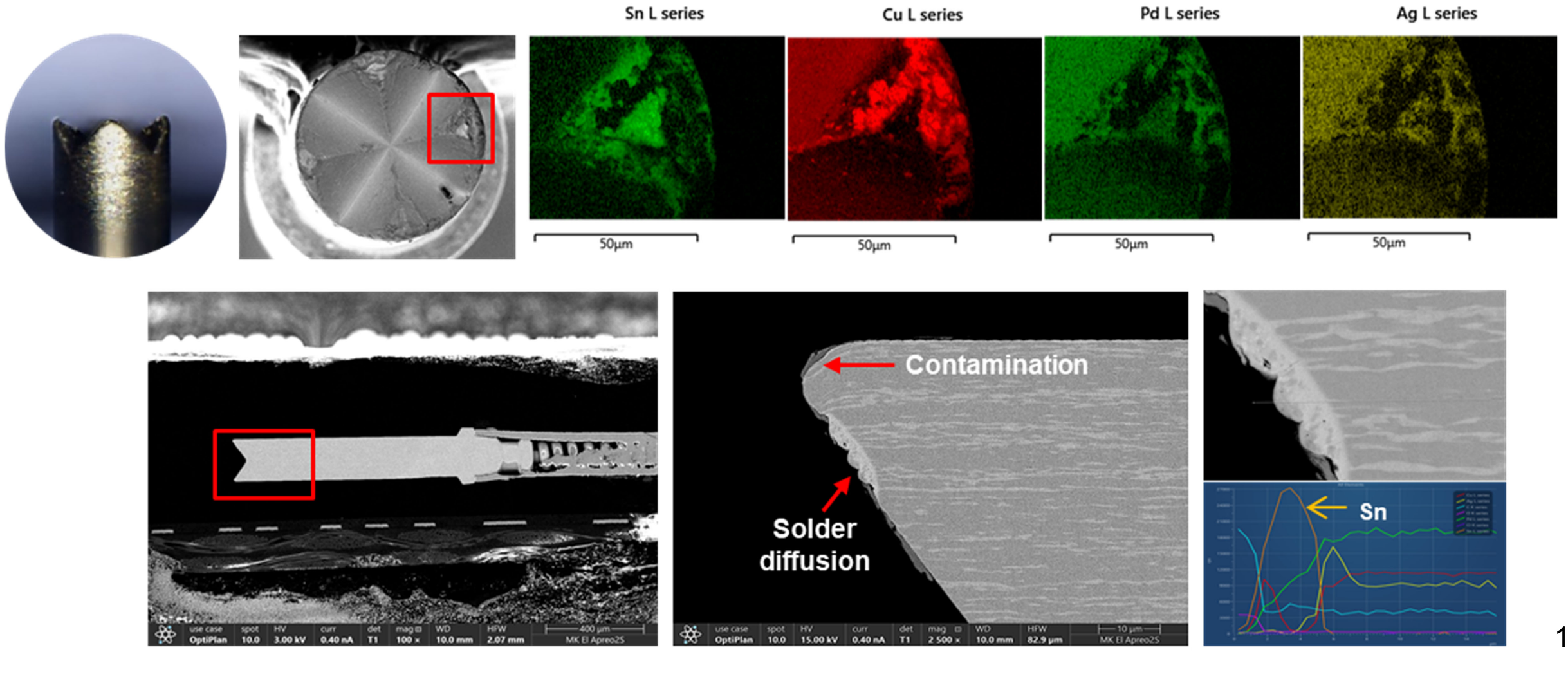
## Ⅰ. Introduction

- The solder ball composition is changing from SAC to SAC-Ni-Bi for thermal cycle reliability improvement.



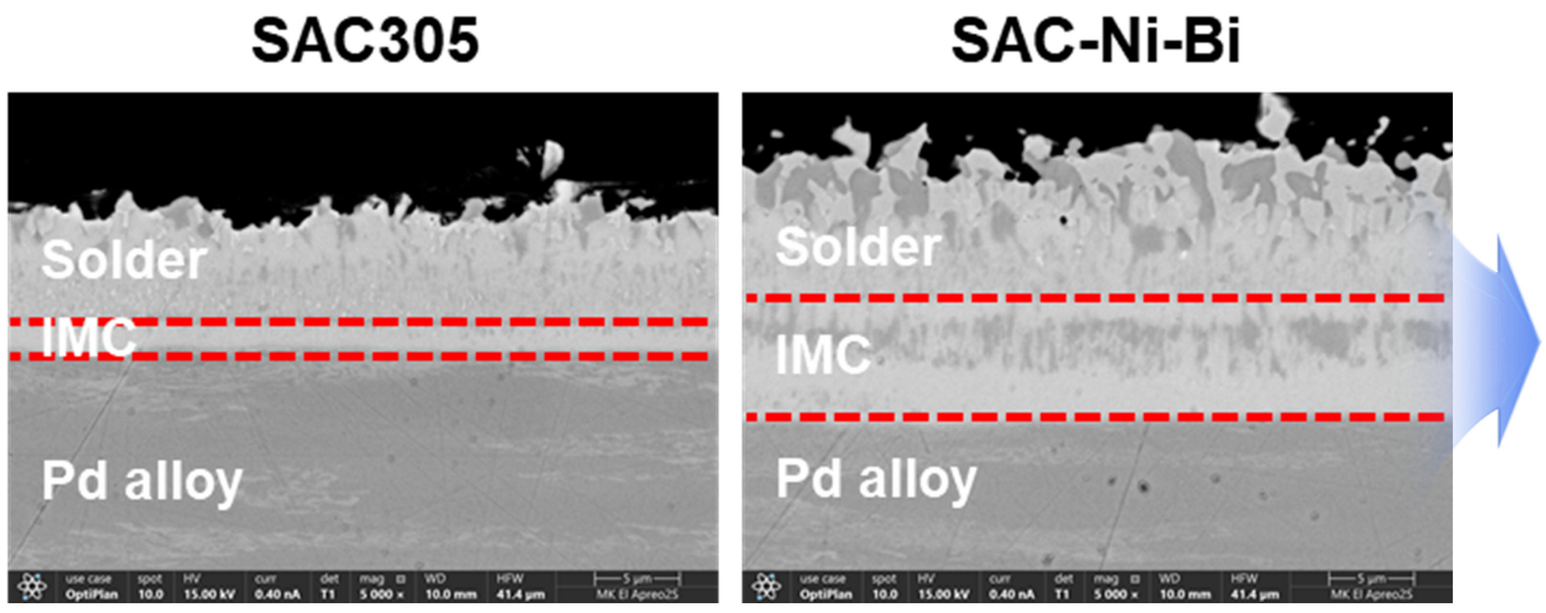




- But these composition changes affect the interfacial reactivity where pogo pin plungers contact the solder during testing process.
- Solder diffusion and contamination at the plunger interface were observed due to solder ball contact.



## Ⅱ. Design

- The addition of Bi in solder accelerates solder diffusion at the contact interface with Pd alloy material. → Increase IMC thickness



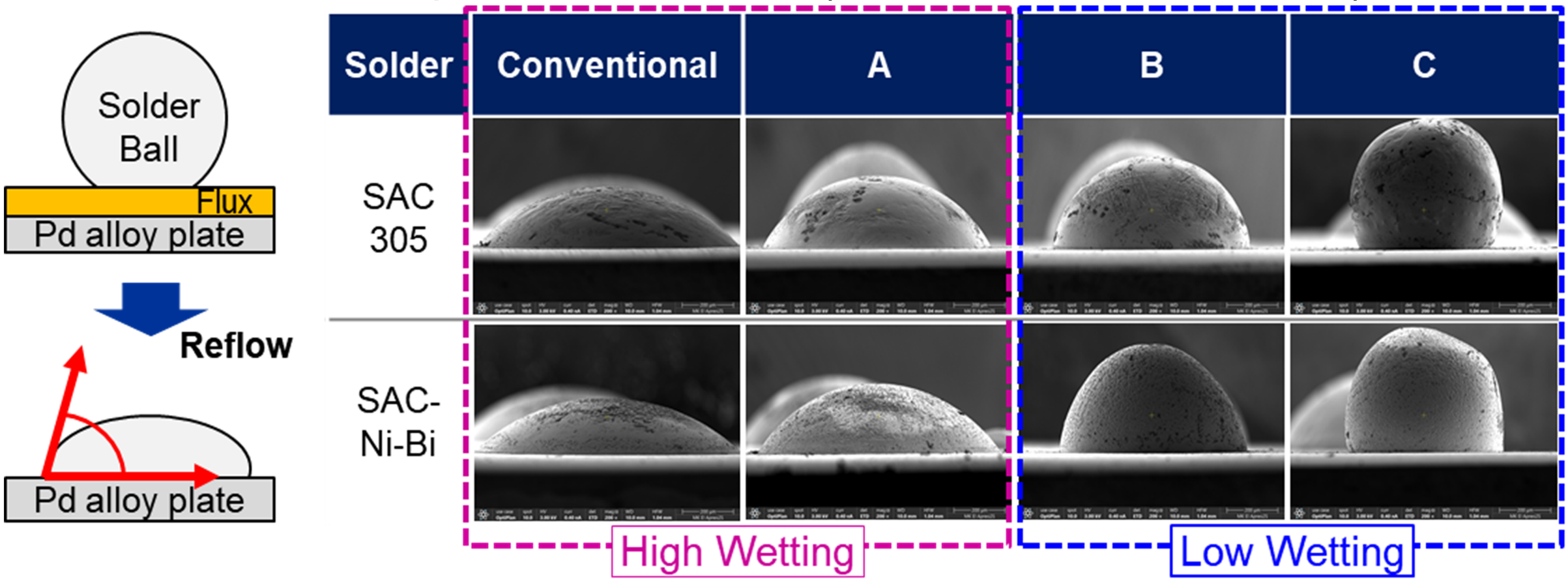

**To increase test life of Pogo pin, solder diffusion needs to be delayed.**

**Adding noble/high melting temp. metals in Pd Alloy.**

## Ⅲ. Testing & Results

### 1. Wetting test

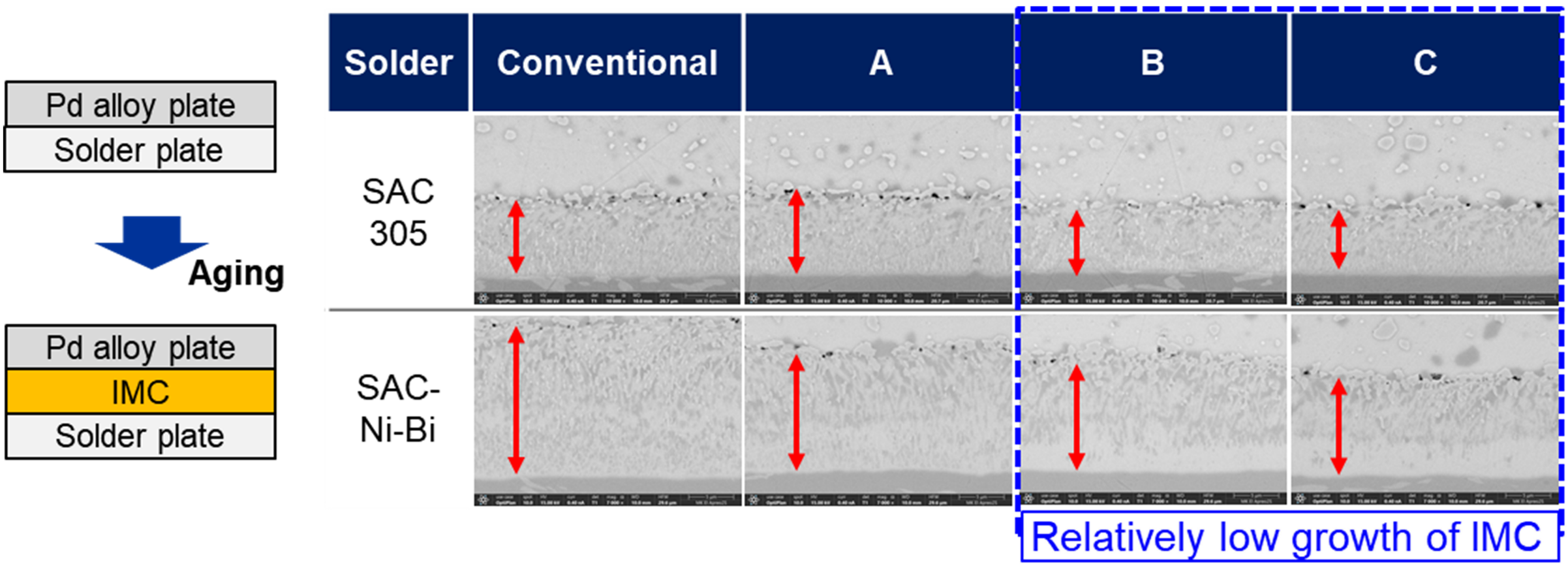
: Evaluate solder spread after reflow. (Max. 290℃ / 180mm/min)




### 2. IMC (Intermetallic Compound) difference comparison

: Pd alloy plate and Sn plate are bonded at 130℃

: After aging the bonded plate, evaluate IMC thickness. (125℃ / 110h)

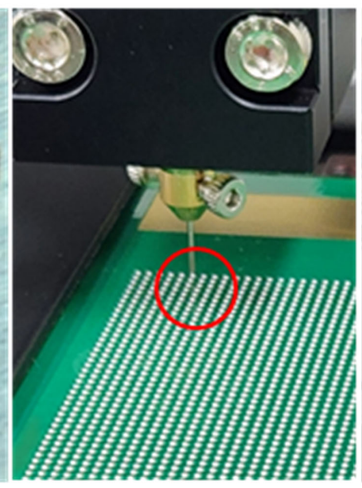
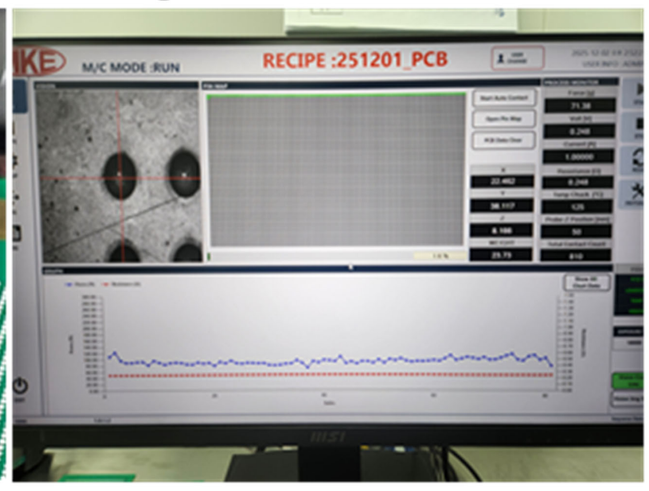


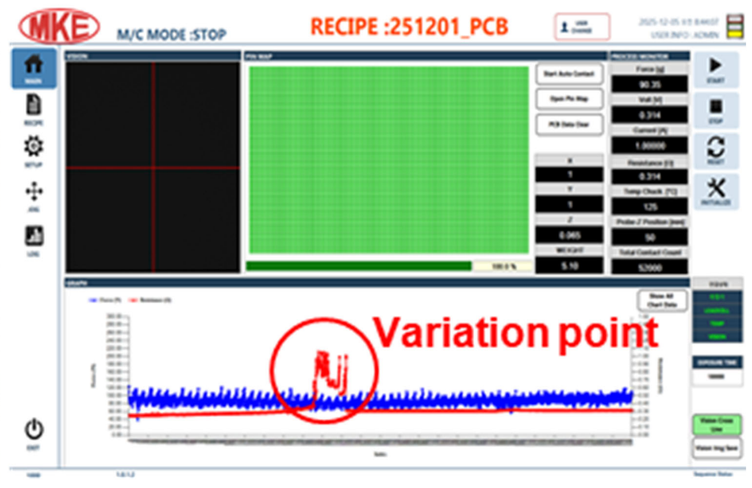
## 3. Contact resistance test

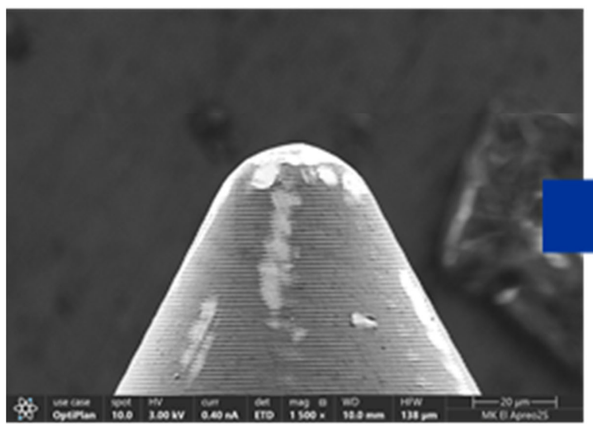
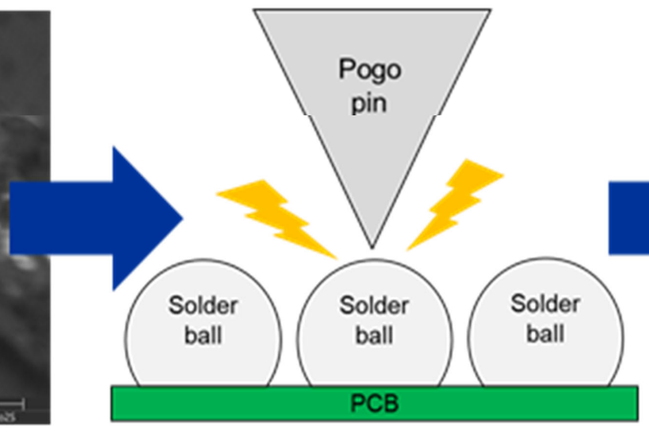
: Measure the change in contact resistance depending on the number of times the plunger touches down on the SAC-Ni-Bi solder.
(Cone tip: 60º / Current: 1A / Voltage: 5V / Count: 50k)

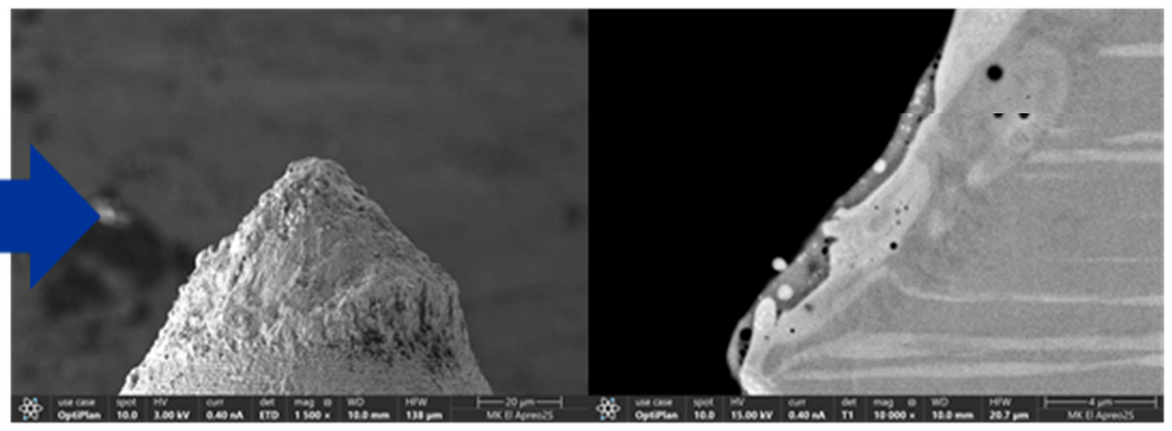
**< Test system >**







| Solder | Conventional | A | B | C |
|---|---|---|---|---|
| **Resistance variation point** | 19k | 21k | **26k** | **28k** |

40~50% Long life

## Ⅳ. Summary

- The new Pd alloy design material(B, C) reduced solder reactivity under SAC-Ni-Bi condition.

| | Conventional | A | B | C |
|---|---|---|---|---|
| **Wetting** | 46º | 60º | **80º** | **102º** |
| **IMC thickness difference** | 10um | 7.5um | **7um** | **6um** |
| **Resistance variation point** | 19k | 21k | **26k** | **28k** |

- Type B & C material service life improves by 40~50% compared to conventional material.
- Further study: The developed material will be mounted on a test socket and subjected to field testing.

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