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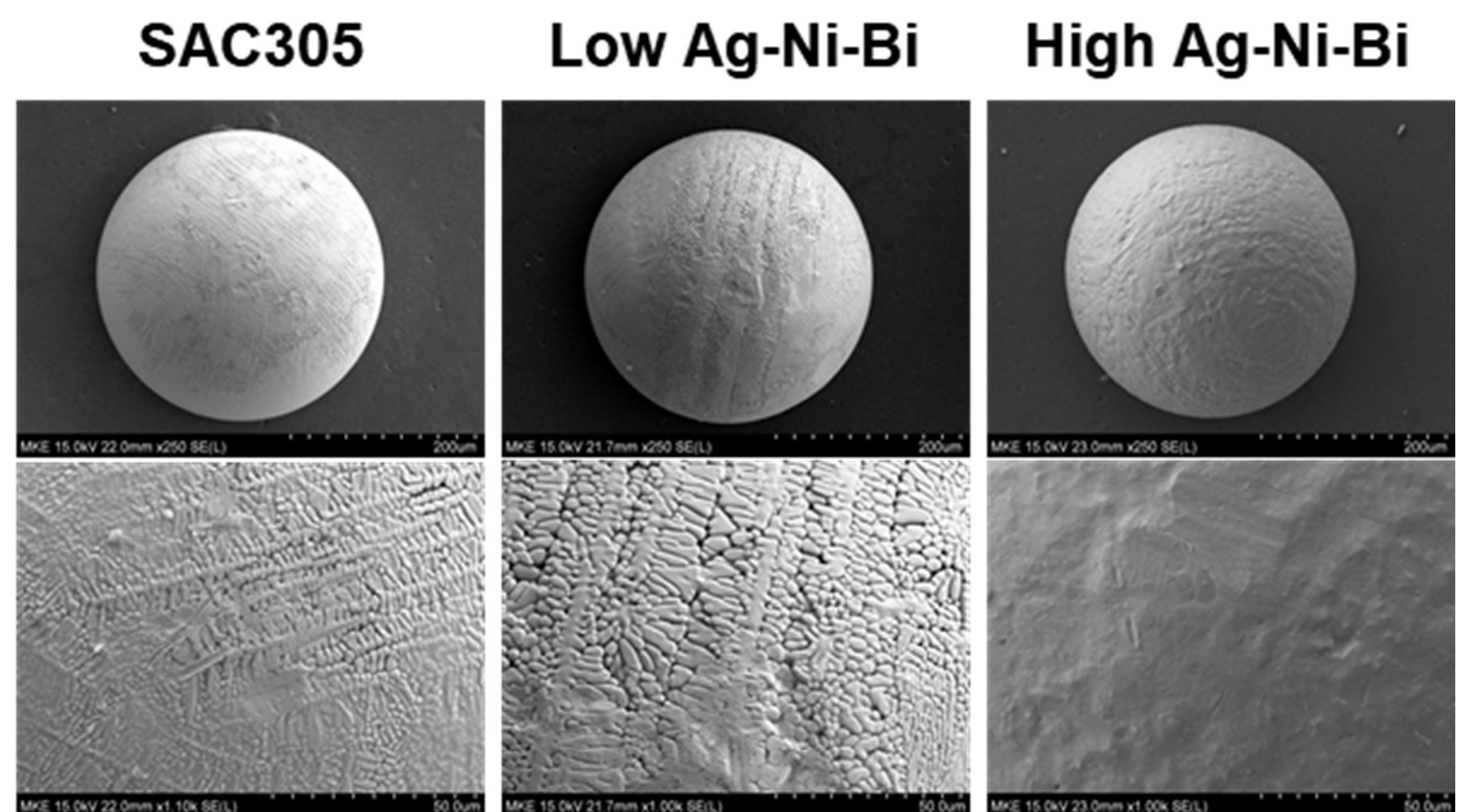
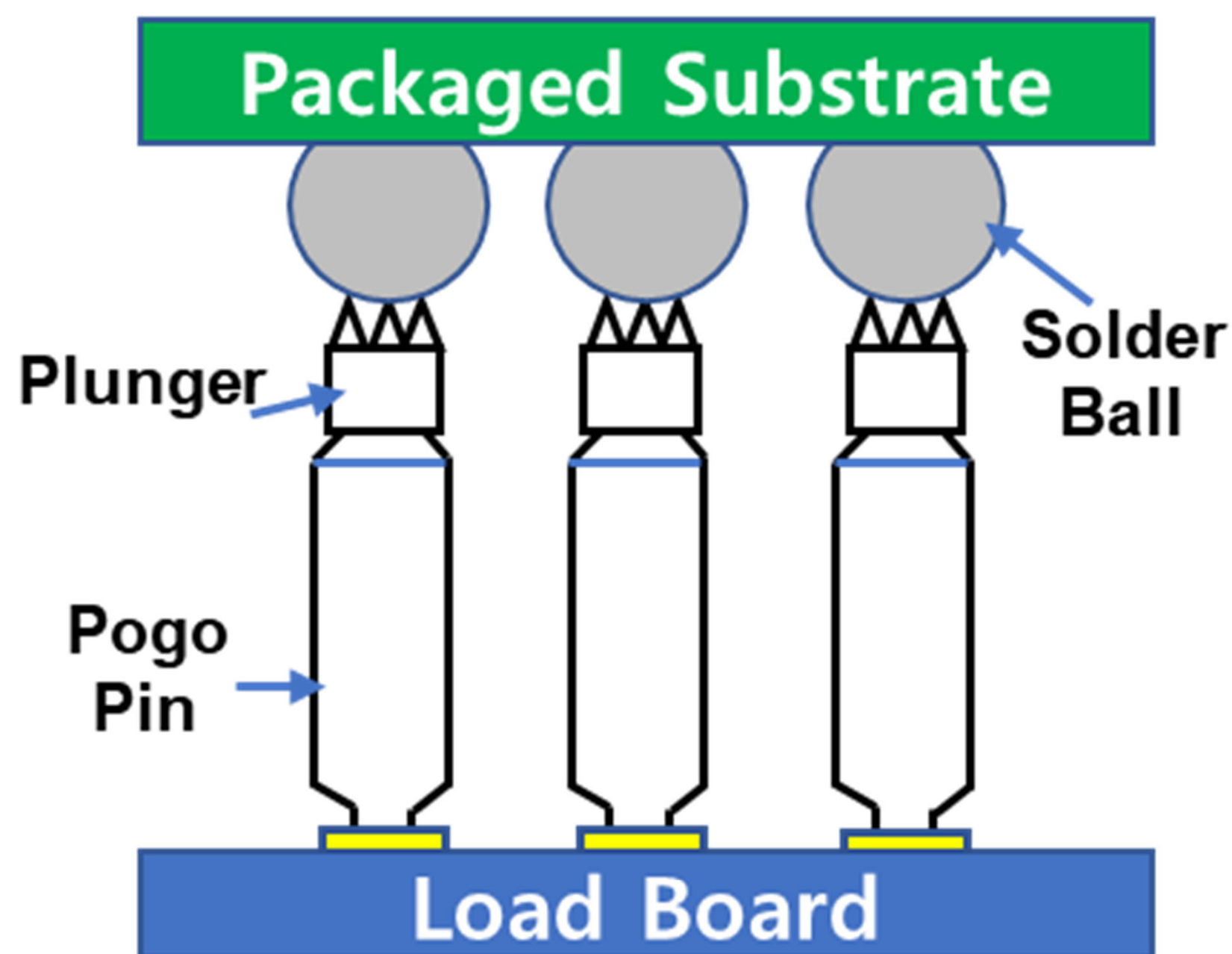
DoubleTree by Hilton
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A new pogo pin plunger material : Enhancement of shortened material life caused by solder reactivity

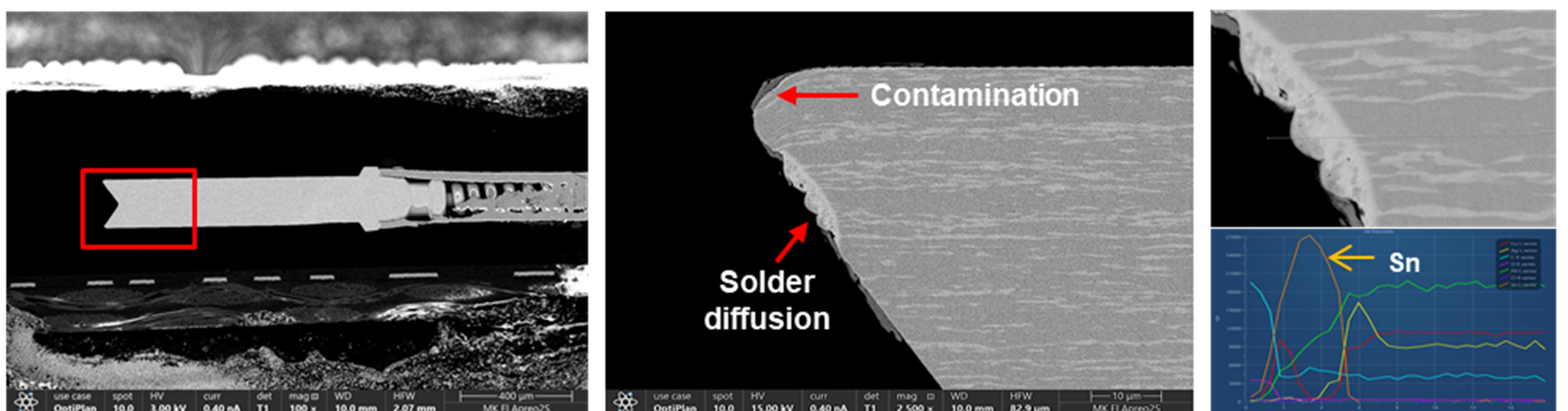
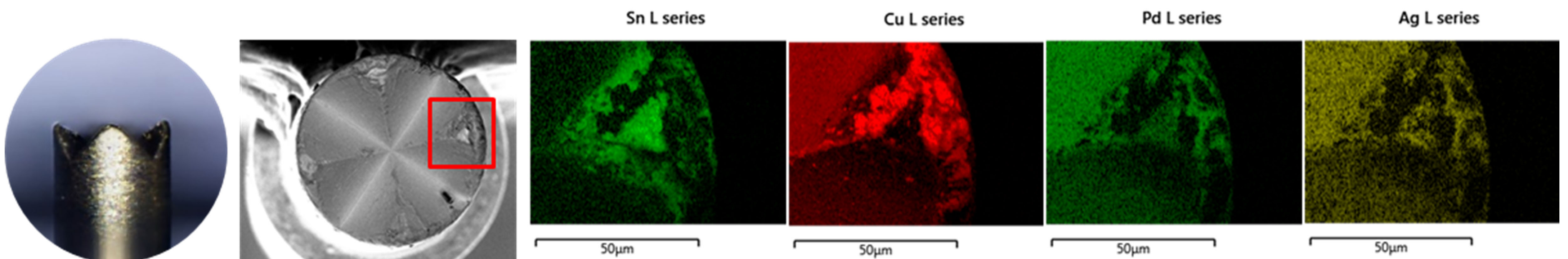
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I. Introduction

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

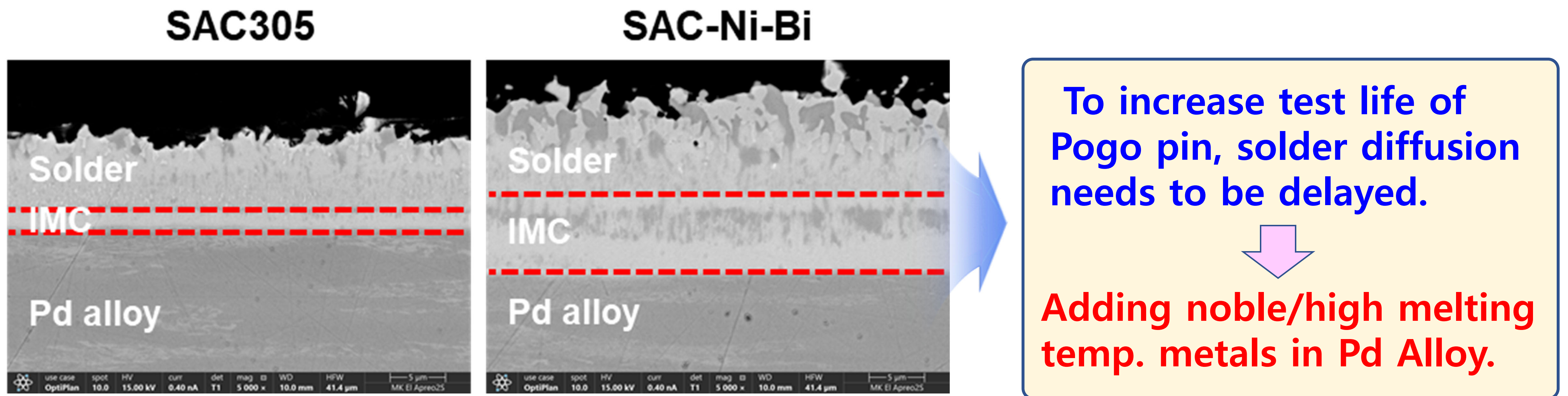


- But these composition changes affect the interfacial reactivity where pogo pin plungers contact the solder during testing process.
- Solder diffusion and contamination at the plunger interface were observed due to solder ball contact.



II. Design

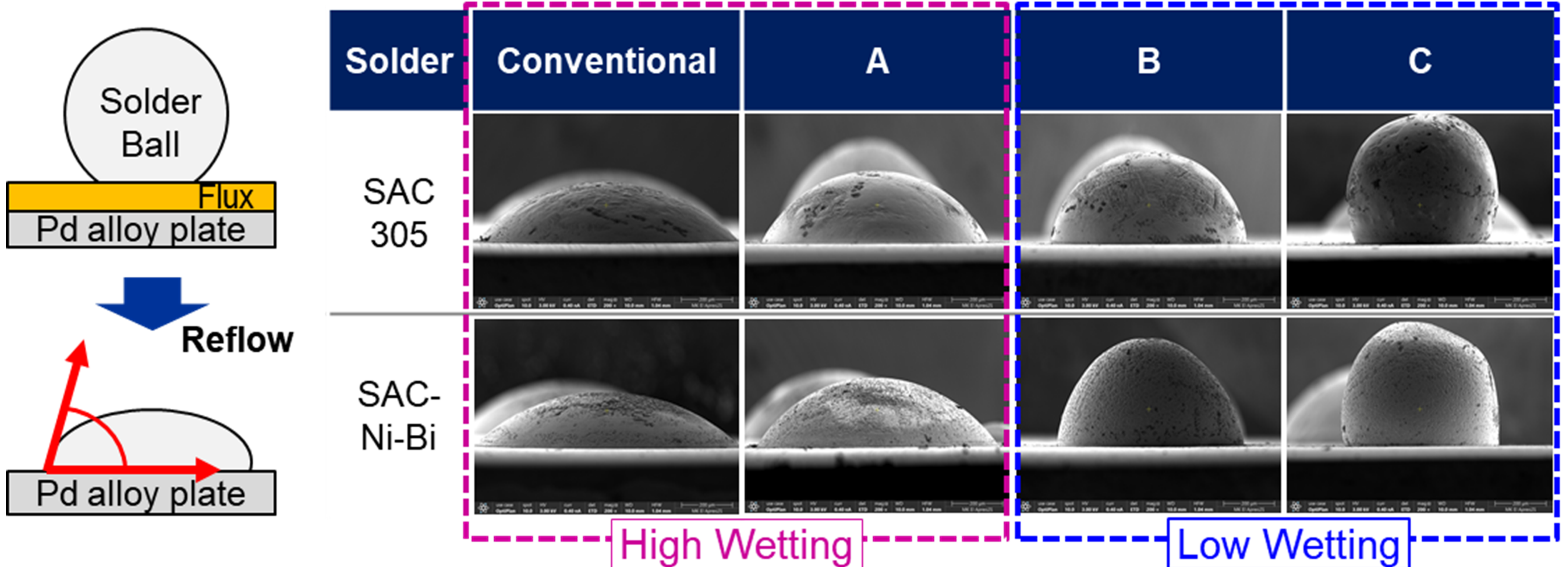
- The addition of Bi in solder accelerates solder diffusion at the contact interface with Pd alloy material. → Increase IMC thickness



III. Testing & Results

1. Wetting test

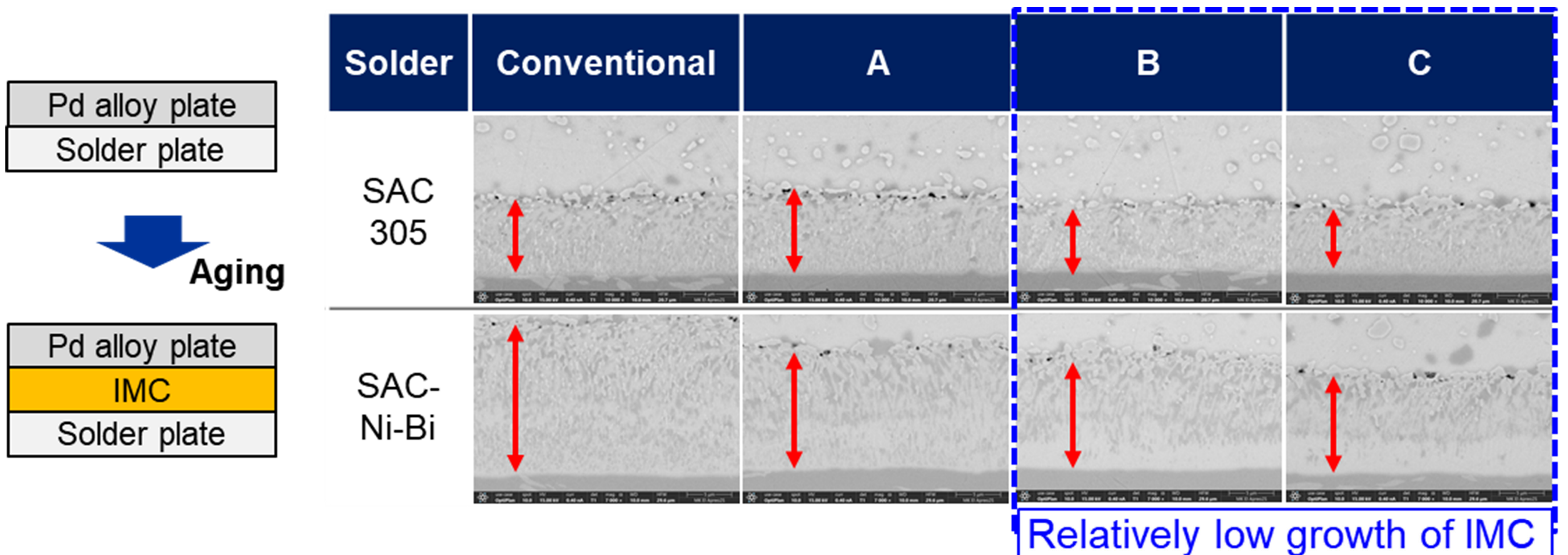
: Evaluate solder spread after reflow. (Max. 290°C / 180mm/min)



2. IMC (Intermetallic Compound) difference comparison

: Pd alloy plate and Sn plate are bonded at 130°C

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

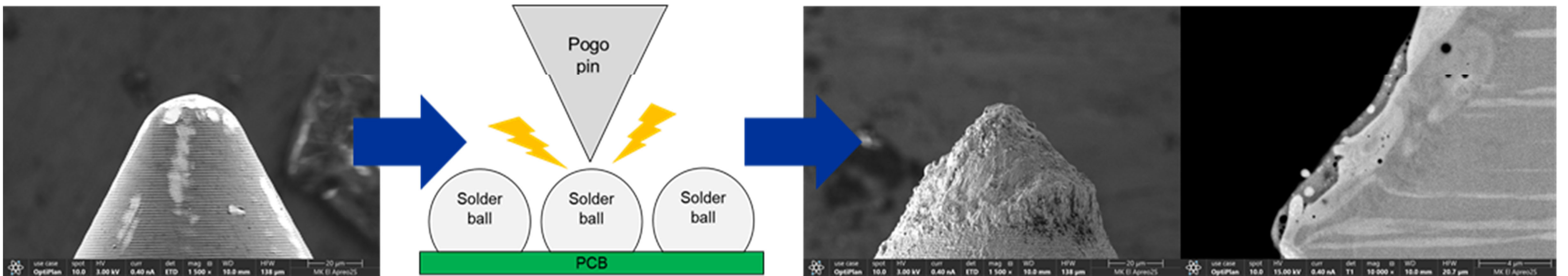
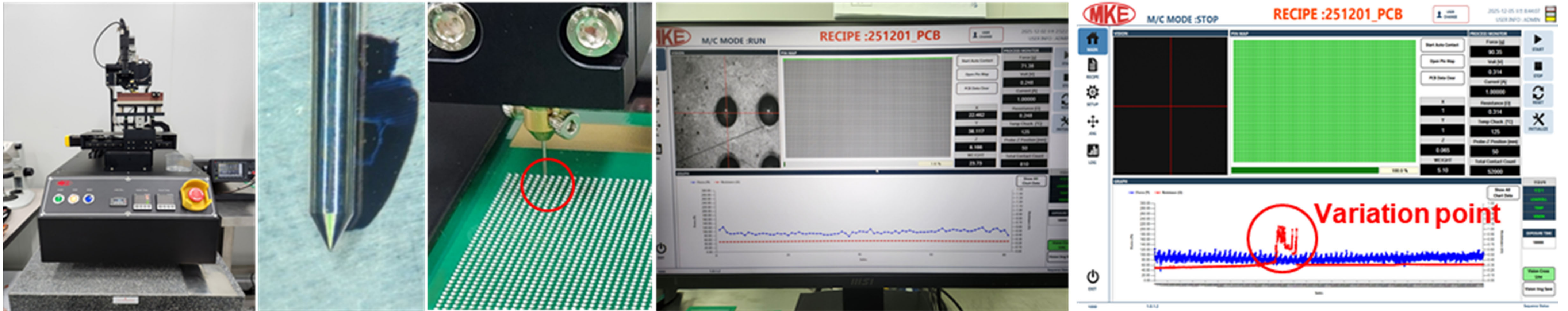


3. Contact resistance test

: Measure the change in contact resistance depending on the number of times the plunger touches down on the SAC-Ni-Bi solder.

(Cone tip: 60° / 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 | 46° | 60° | 80° | 102° |
| 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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