

Silicon Micro-Cantilever Probe Card

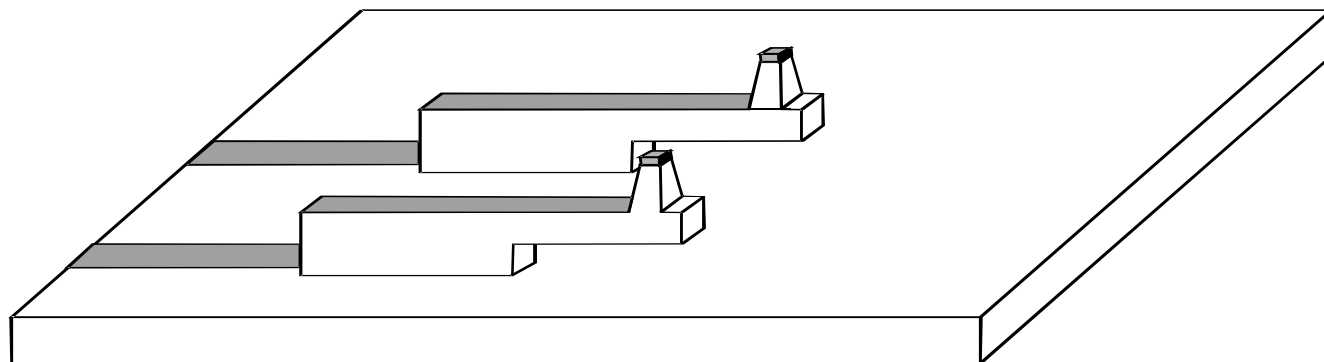
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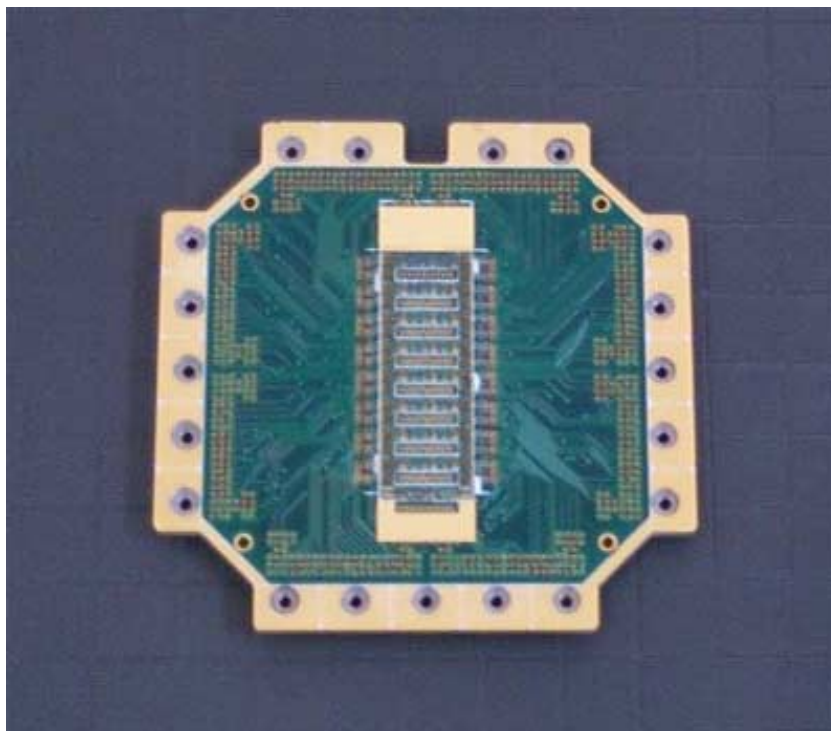
1. Schematics

- Single crystal probe material
- Cr/Au metal wiring
- Application of semiconductor and MEMS manufacturing processes

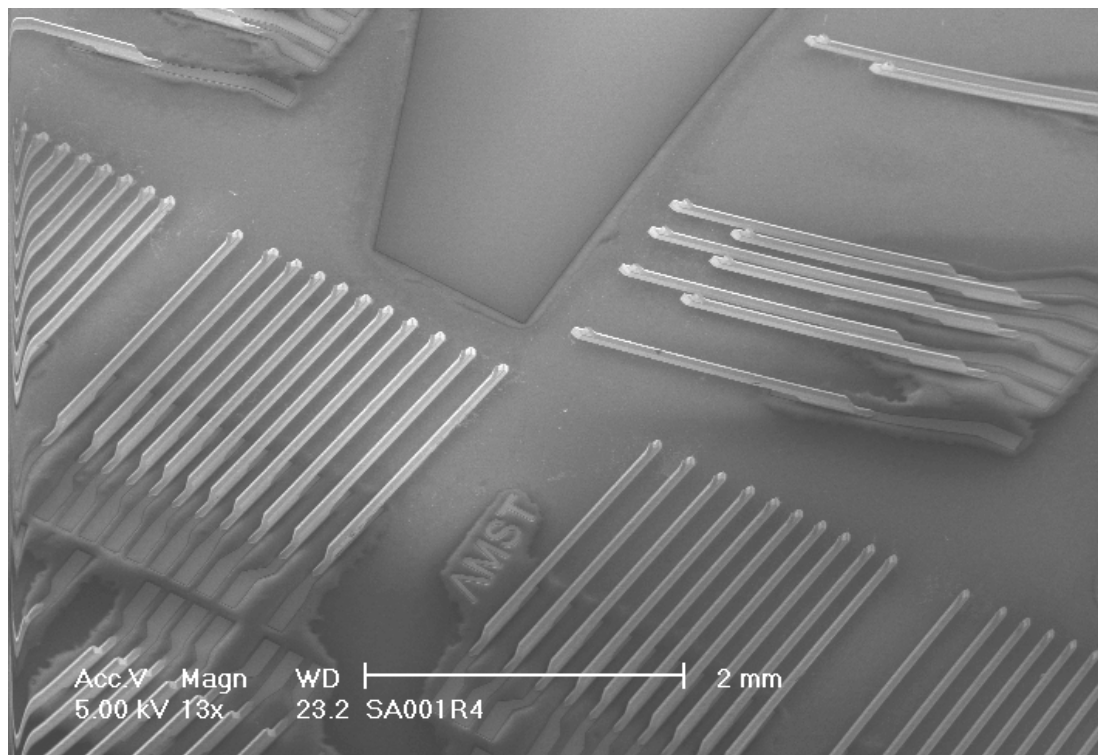


2. *Sample*

- **Sample 8X device testing probe card**

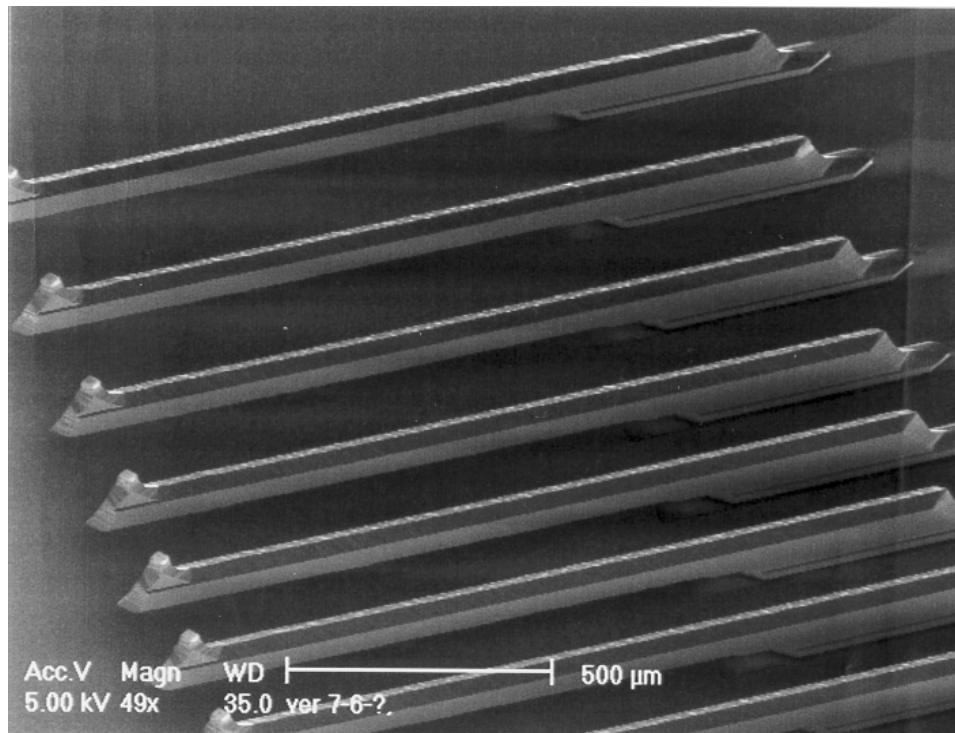


3-1. SEM of Needles(1)



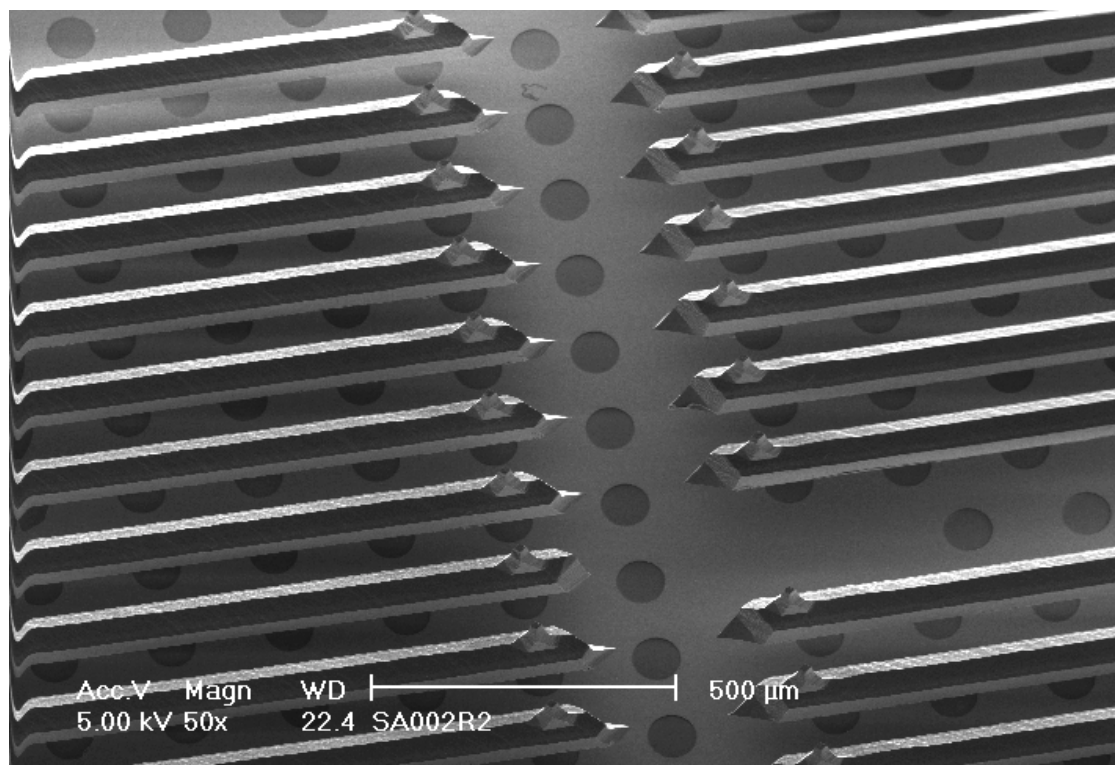
Probe Needles for square pad array

3-2. SEM of Needles(2)



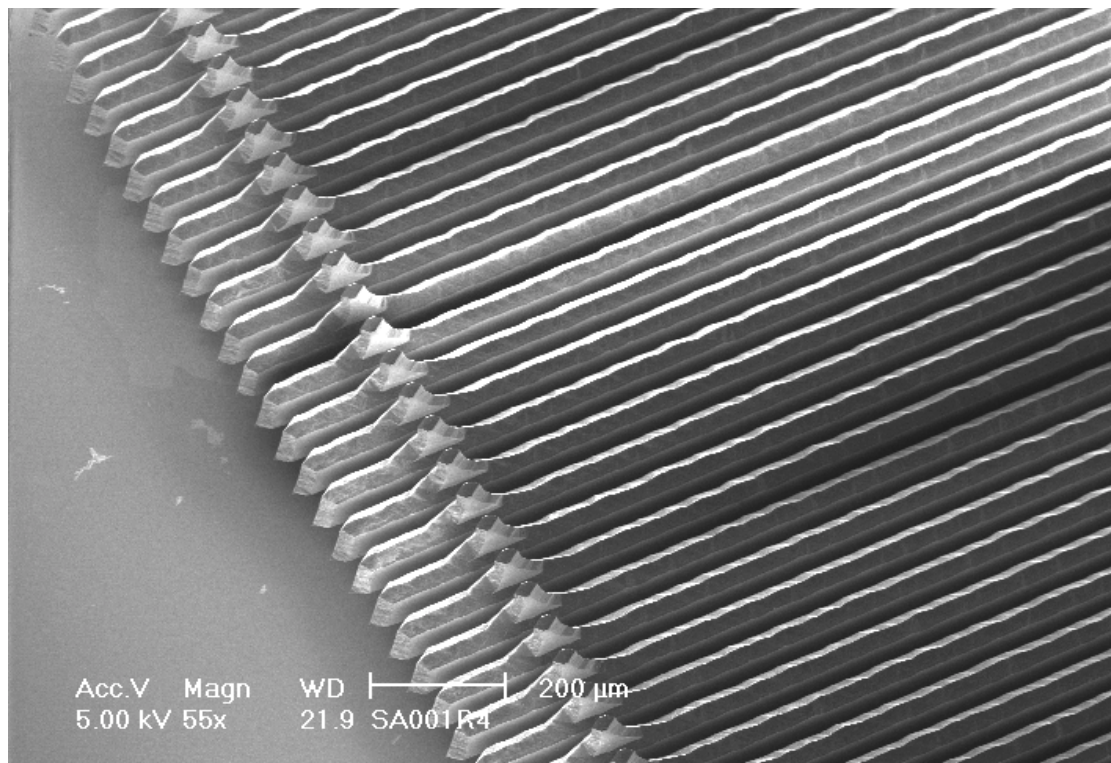
Magnified view of the probe needles

3-3. SEM of Needles(3)



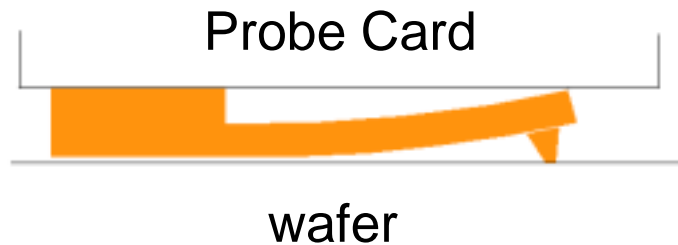
Probe needles for pads 300micron apart

3-4. SEM of Needles(4)

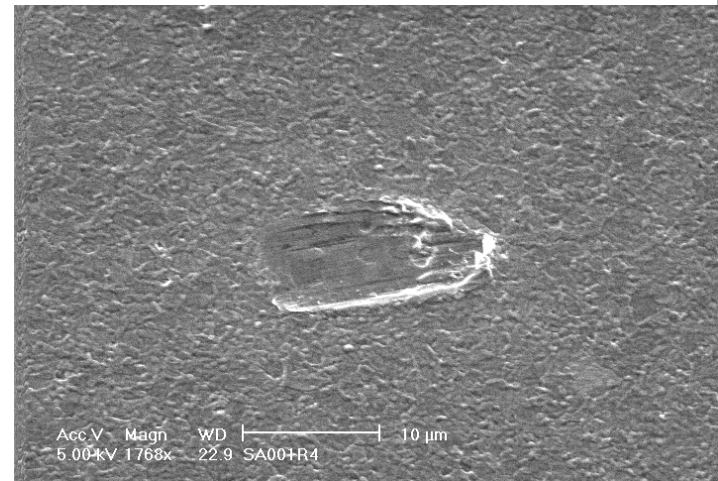


Probe needles for LCD testing (65micron pitch)

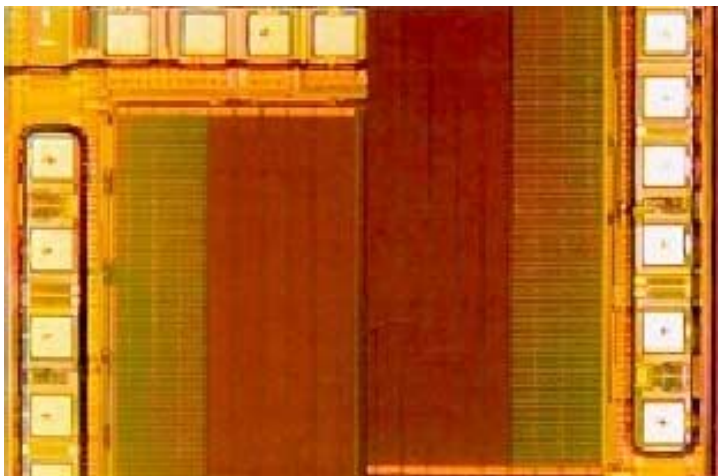
4-1. Probe Mark(1)



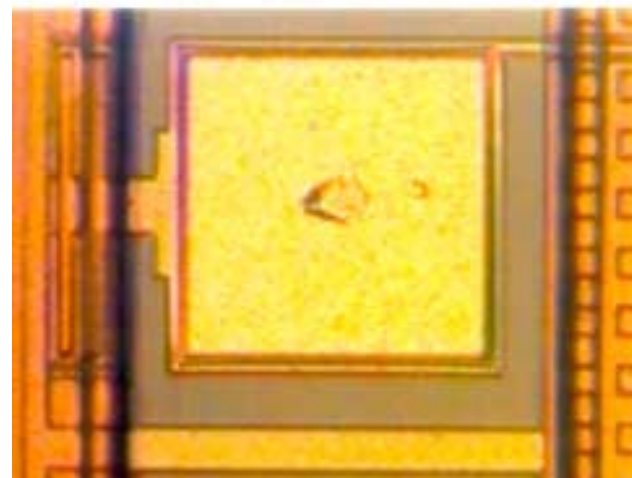
The Probe mark is made only by
the back half of the tip.
The size of the probe mark is less
than 20micron.



4-2. Probe Mark(2)

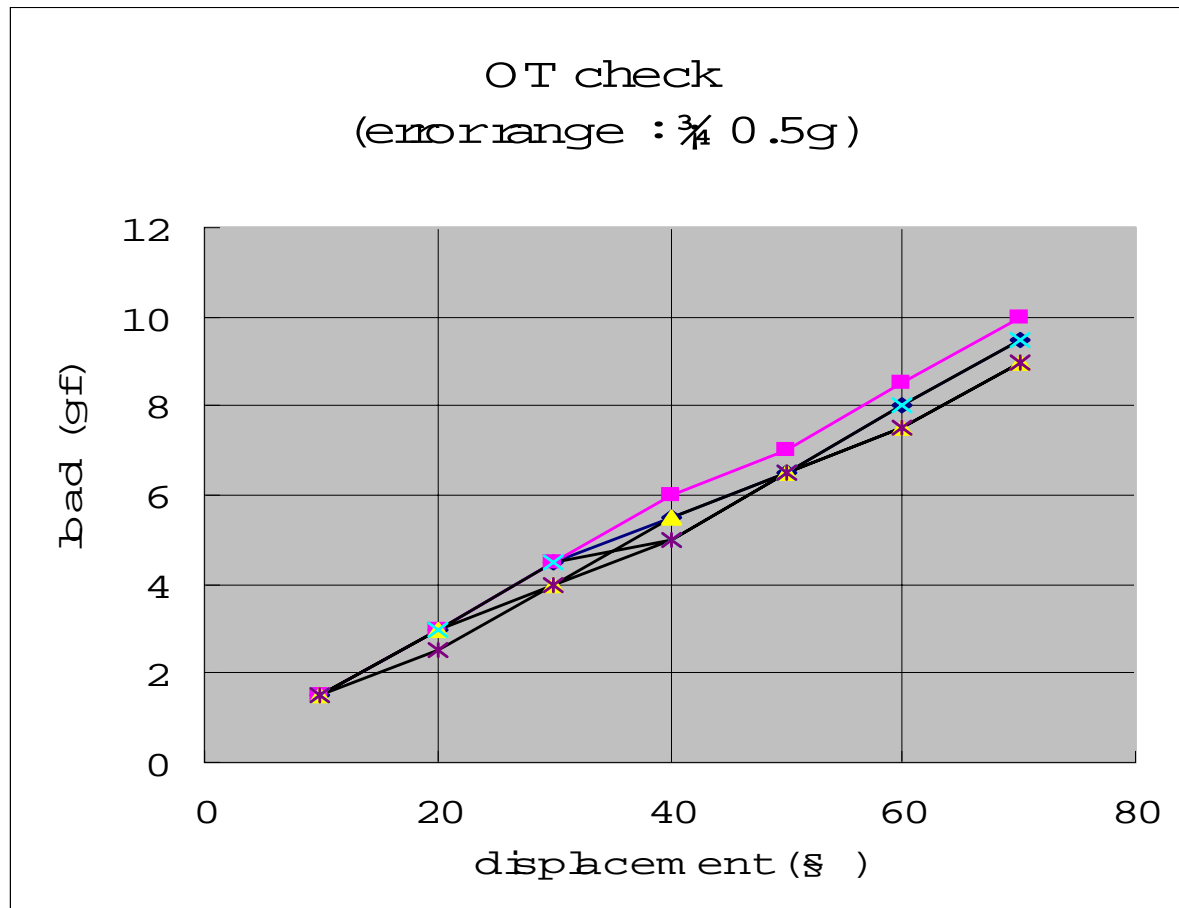


SRAM pad and the probe mark

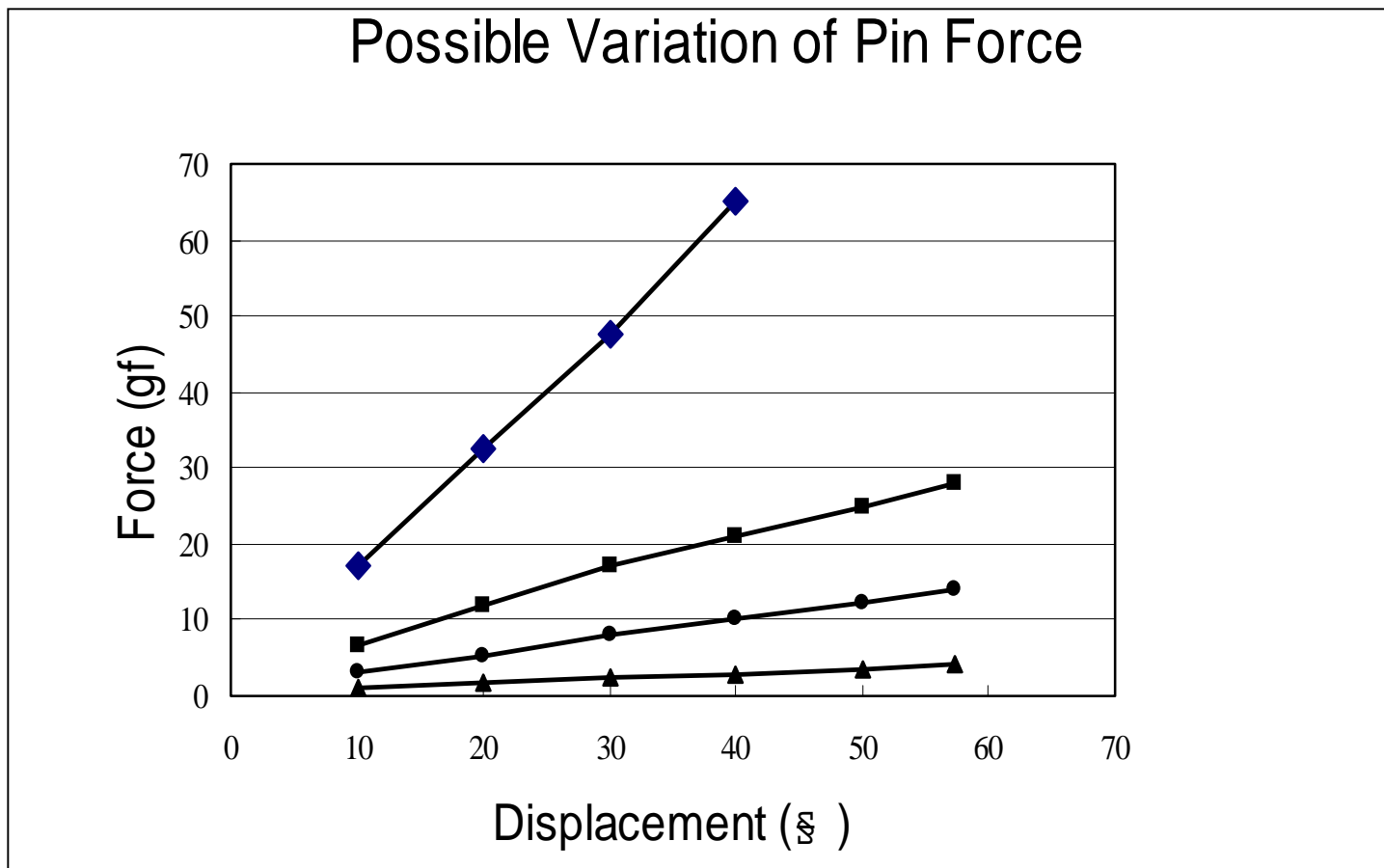


Enlarged view

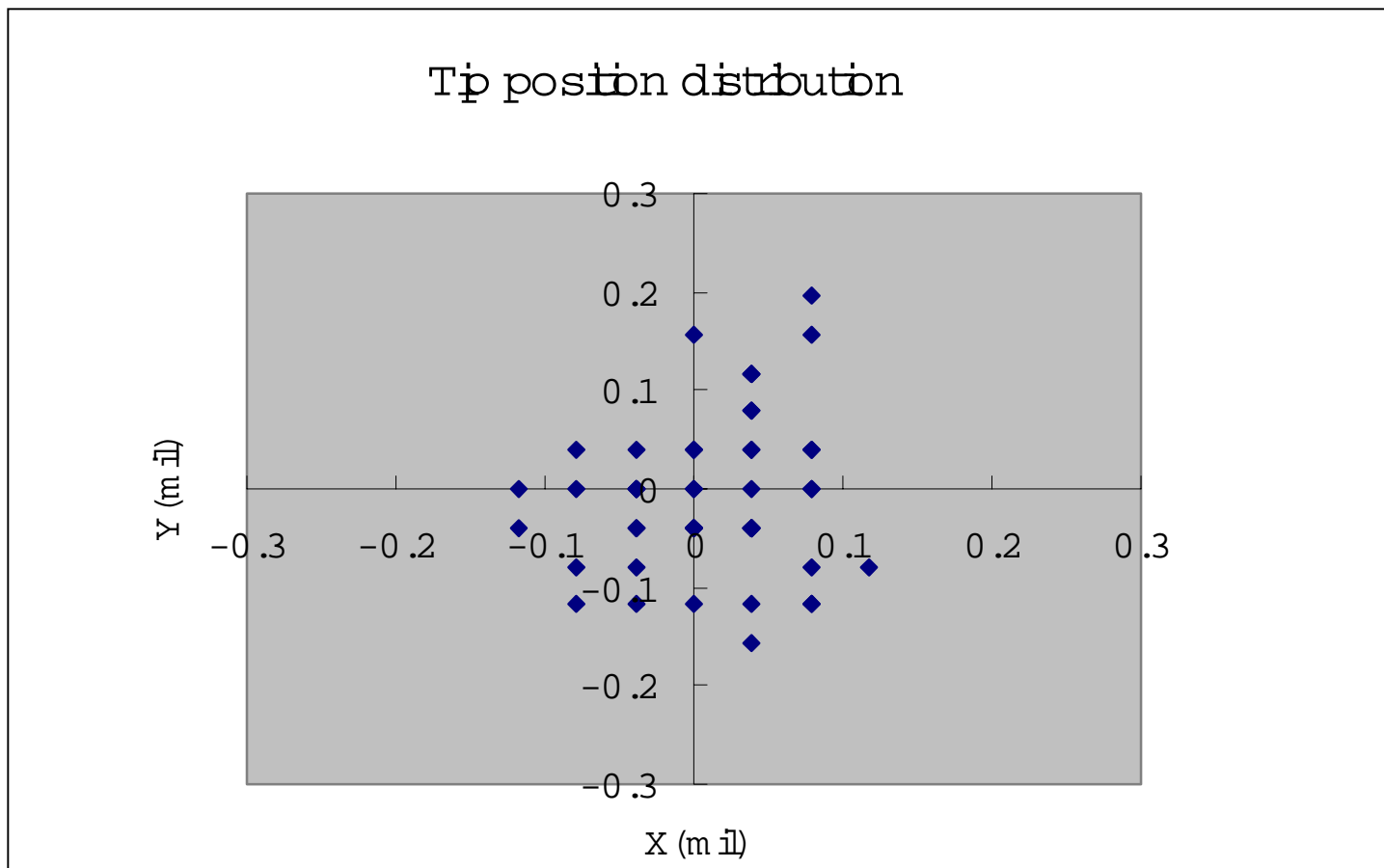
5-1. Pin Force Measurements(1)



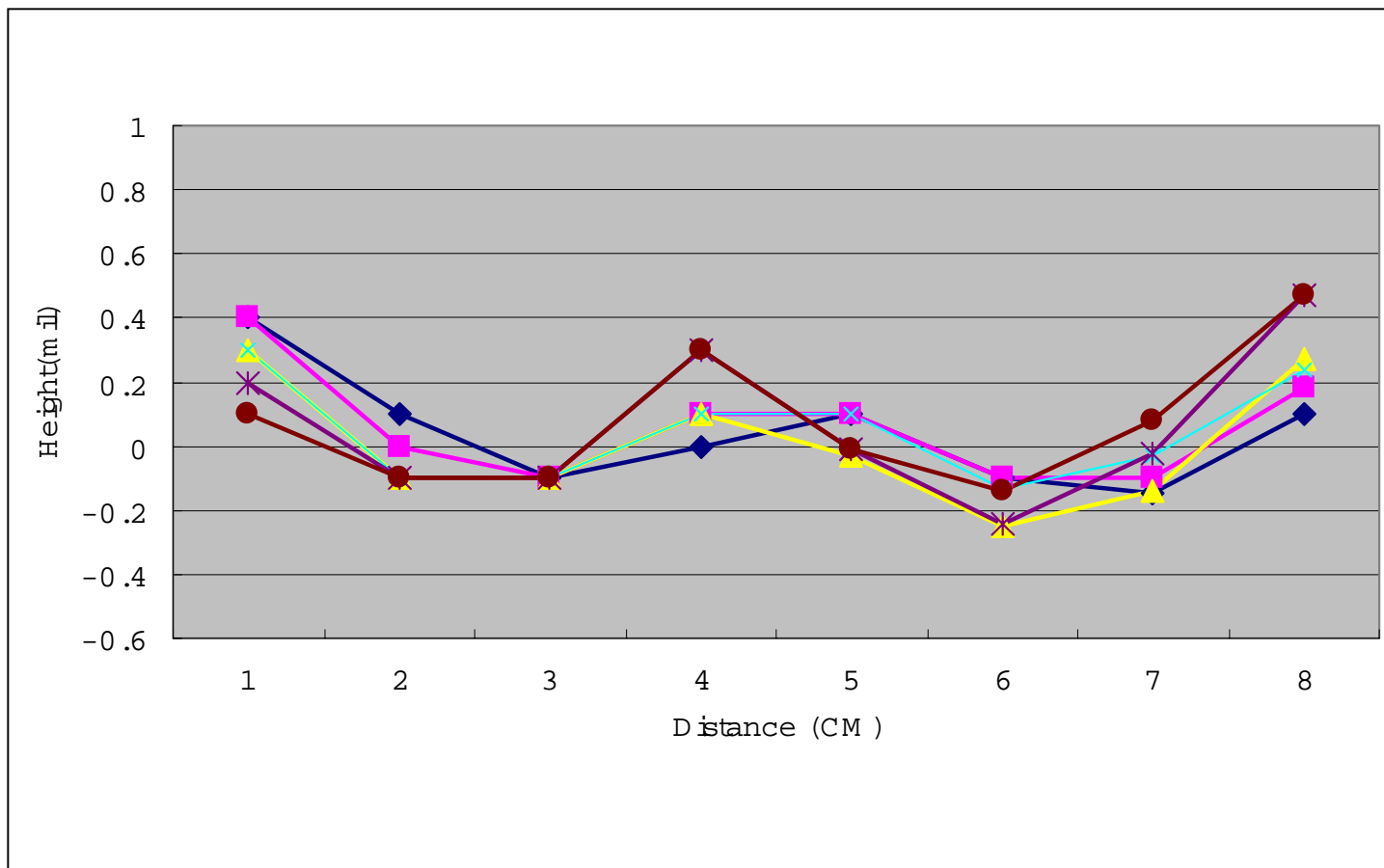
5-2. Pin Force Measurements (2)



5-3. Tip Position Measurement



5-4. Tip Planarity Measurement



5-4. Resistivity

- Resistivity of current samples
 - $R_s = 0.04 \Omega/\square$
 - Resistance : 1.2Ω
- Samples with metal improvements (under development)
 - $R_s = \text{less than } 0.02 \Omega/\square$
 - Resistance : less than 0.6Ω
- Leakage Current
 - less than 1 Nano Ampere

6-1. Characteristics(1)

- High resilience
- No plastic deformation
- Controllable Gram-Force
- Usable with gold bump pad
- Repeatable Mass Production

6-2. Characteristics(2)

- Fine pitch possible(>65 μ m)
- Short pin length(less than 2mm)
- Accurate pin position (within 5 μ m throughout its lifetime)
- Small scrub mark(<20 μ m)
- Low Leakage Current (<1nA)

7. *Current State of Development*

- Step 1 : complete
 - Designing and simulation of the probe block
 - Process development of the probe block
 - PCB design and Assembly process development
 - Electrical properties characterization
- Step 2 : under process
 - Process optimization for the yield improvement
 - Mass production preparation
 - Problem analysis and improvement
- Step 3 : 4th QT 2000- : Mass production

8. *Probe Design Goal*

- Fine Pitch : 45 •
- Tip shape variation
 - Round, octagonal
- Freedom of pin positioning
- Frequency Capability higher than 1Ghz
- 128 Multi-Die Testing
- Assembly improvement