

# PCB Reliability 2014

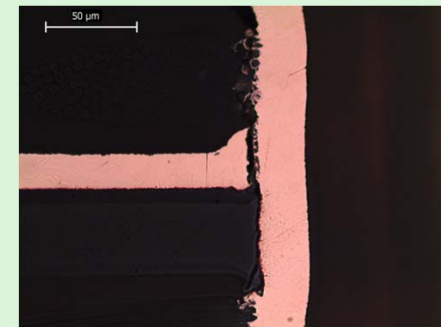
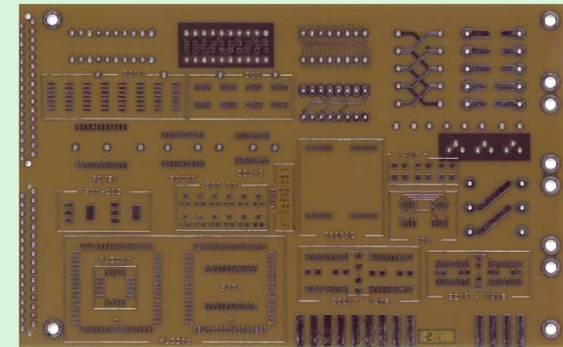
5<sup>TH</sup> ELECTRONIC MATERIALS, PROCESSES AND PACKAGING FOR SPACE EMPPS WORKSHOP

[www.hytek.eu](http://www.hytek.eu)

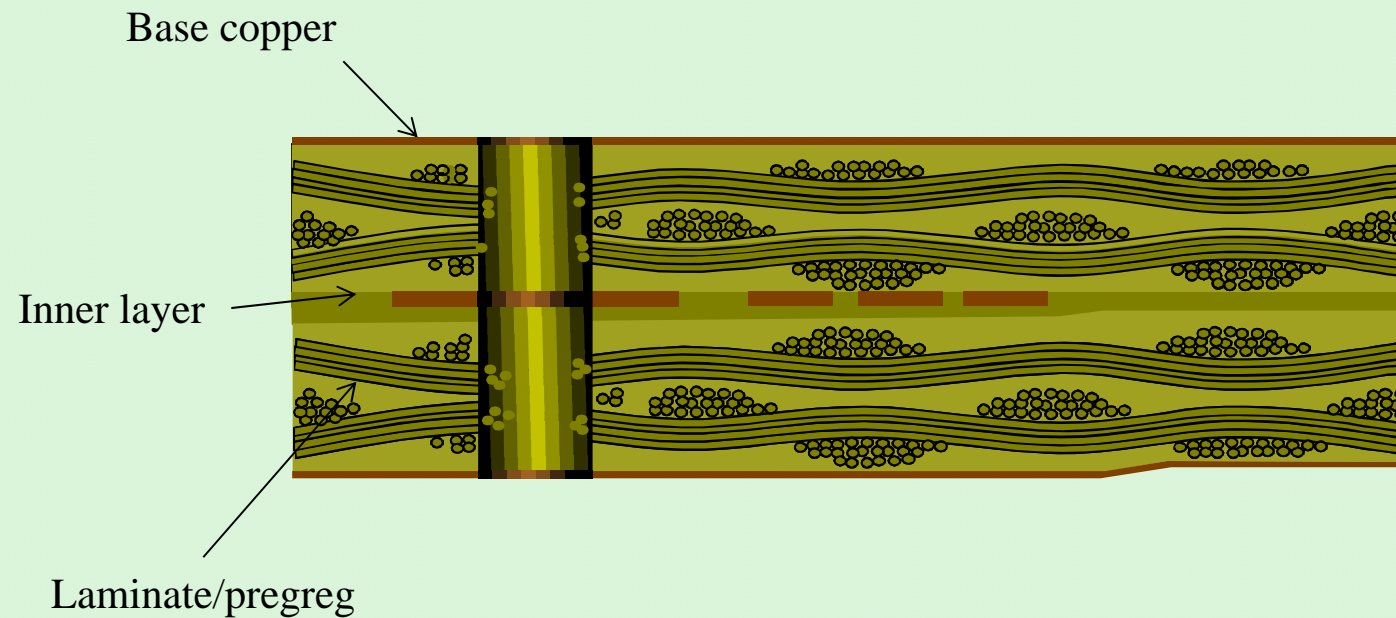


# Abstract

- What is a PCB ?
  - A simple “green board” ?
  - PCB requirements from designer ?
  - PCB design for reliability
    - High density
    - A lot of layers
    - Symmetrical build-up
    - Foot print design
    - ECSS-Q-ST-70-12C
- Challenges in the PCB manufacturing process
  - Laminate and prepreg
  - Drilling process
  - Plating process
  - Etching process
  - Surface finish e.g. fused SnPb
- Reliability
  - ICD (Inter Connect Defects)

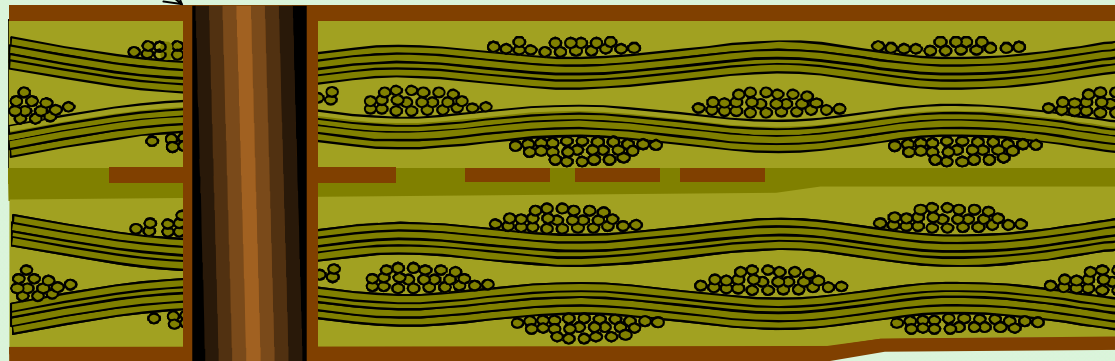


# Hole drill process



# Copper plating process

Plated copper

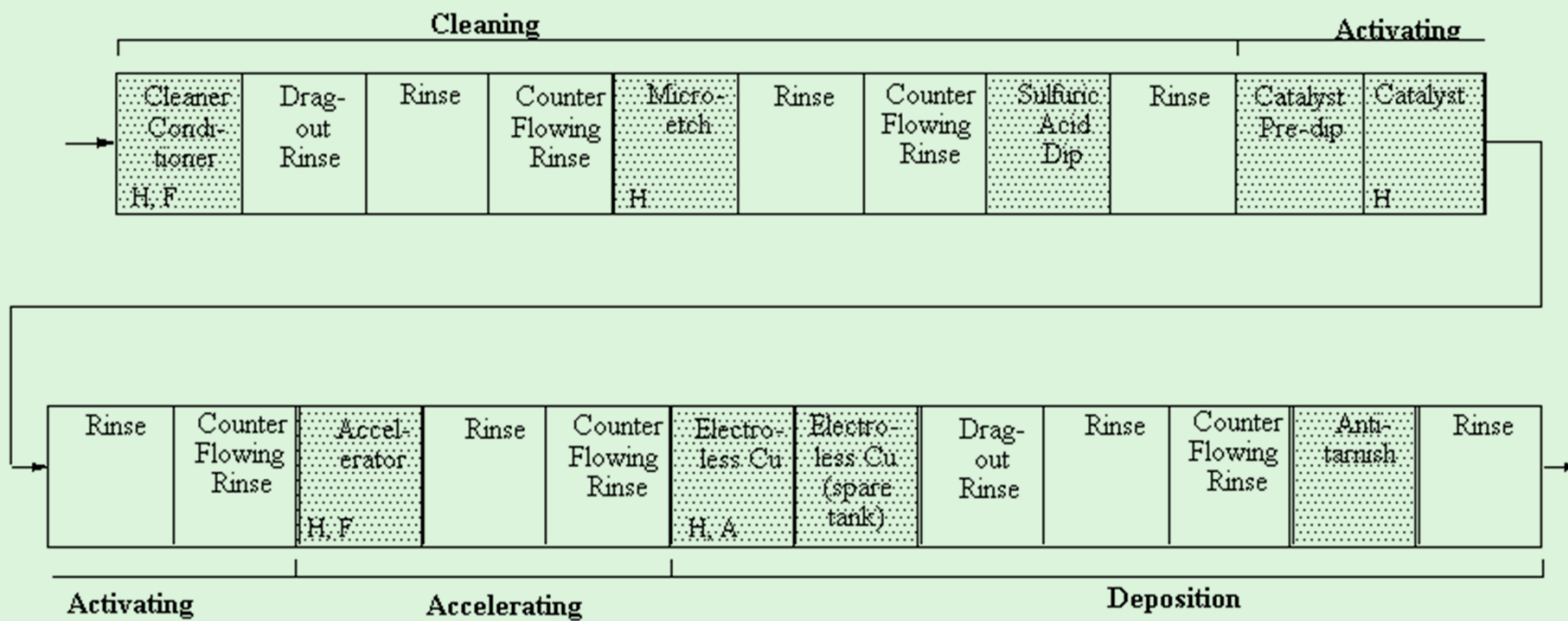




# Example electroless copper plating line

(<http://www.epa.gov/dfe/images/pwb-use-figures/2-12.gif>)

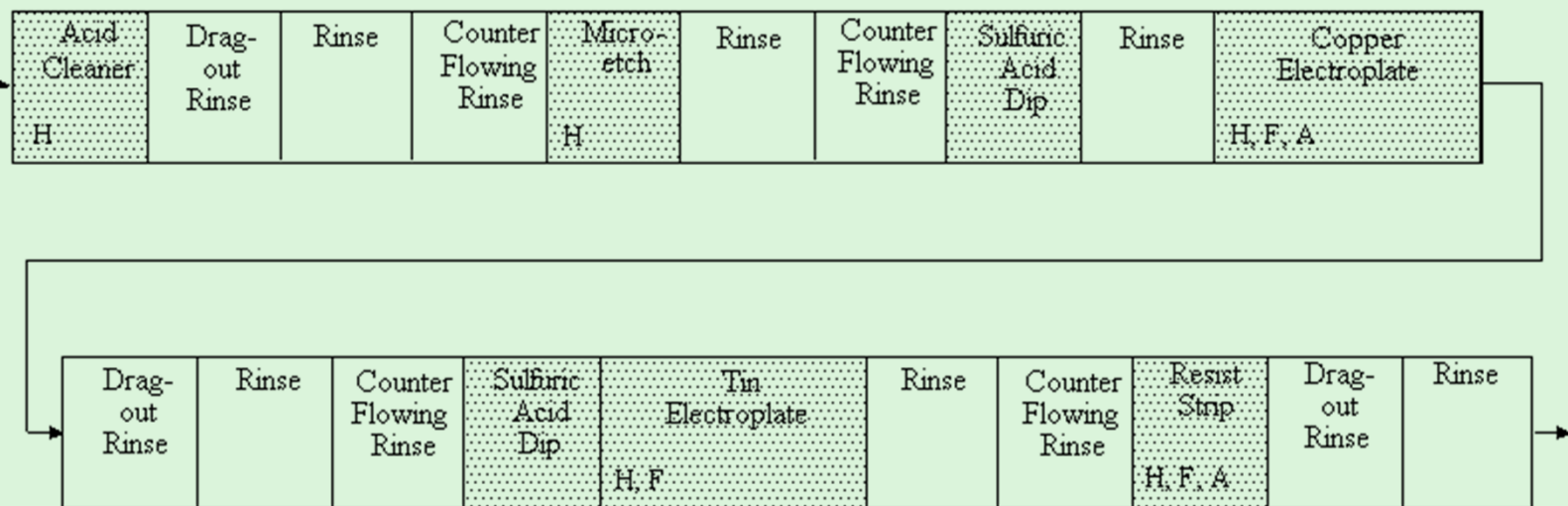
Figure 2-12. Typical Electroless Copper Plating Line.



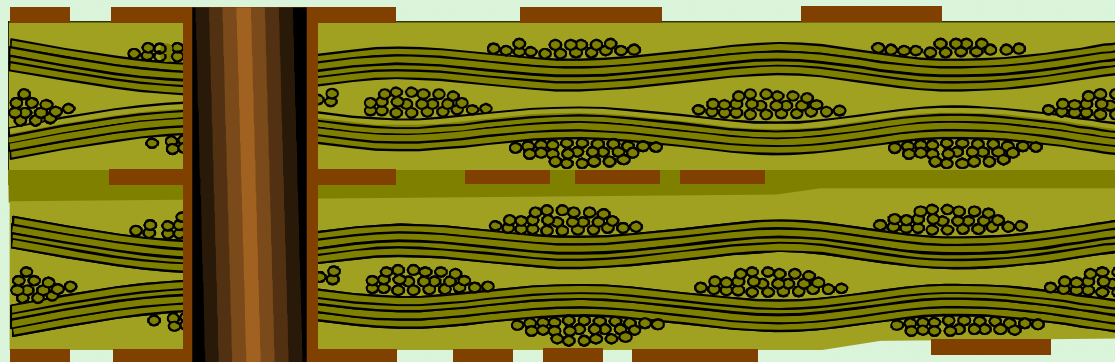
# Example electrolytic copper plating line

(<http://www.epa.gov/dfe/images/pwb-use-figures/2-14.gif>)

Figure 2-14. Typical Pattern Plate, Etch-Resist Photoresist Strip Process Line.



# Etching process



# Example plating process with defect

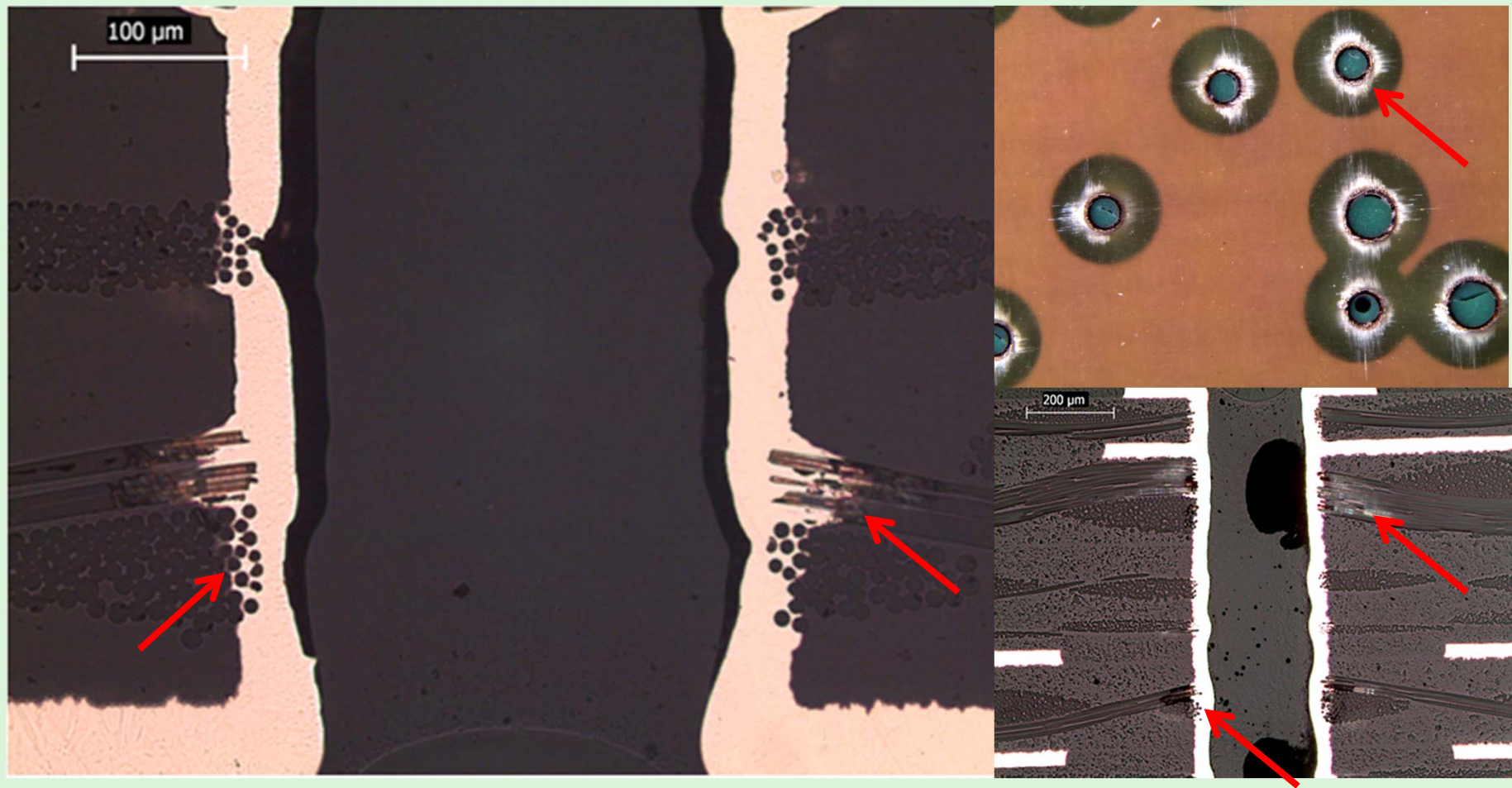
(Ring void)





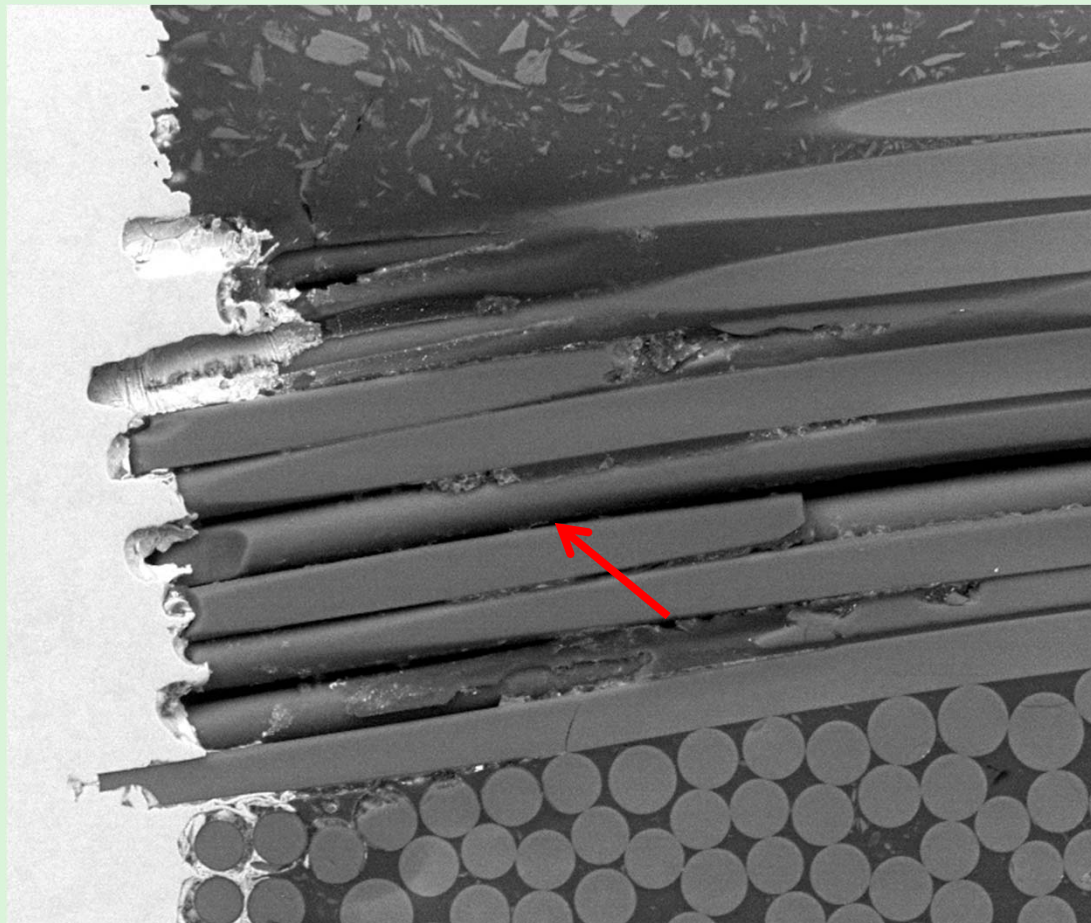
# Example loose glass fibers

(after drilling and plating)



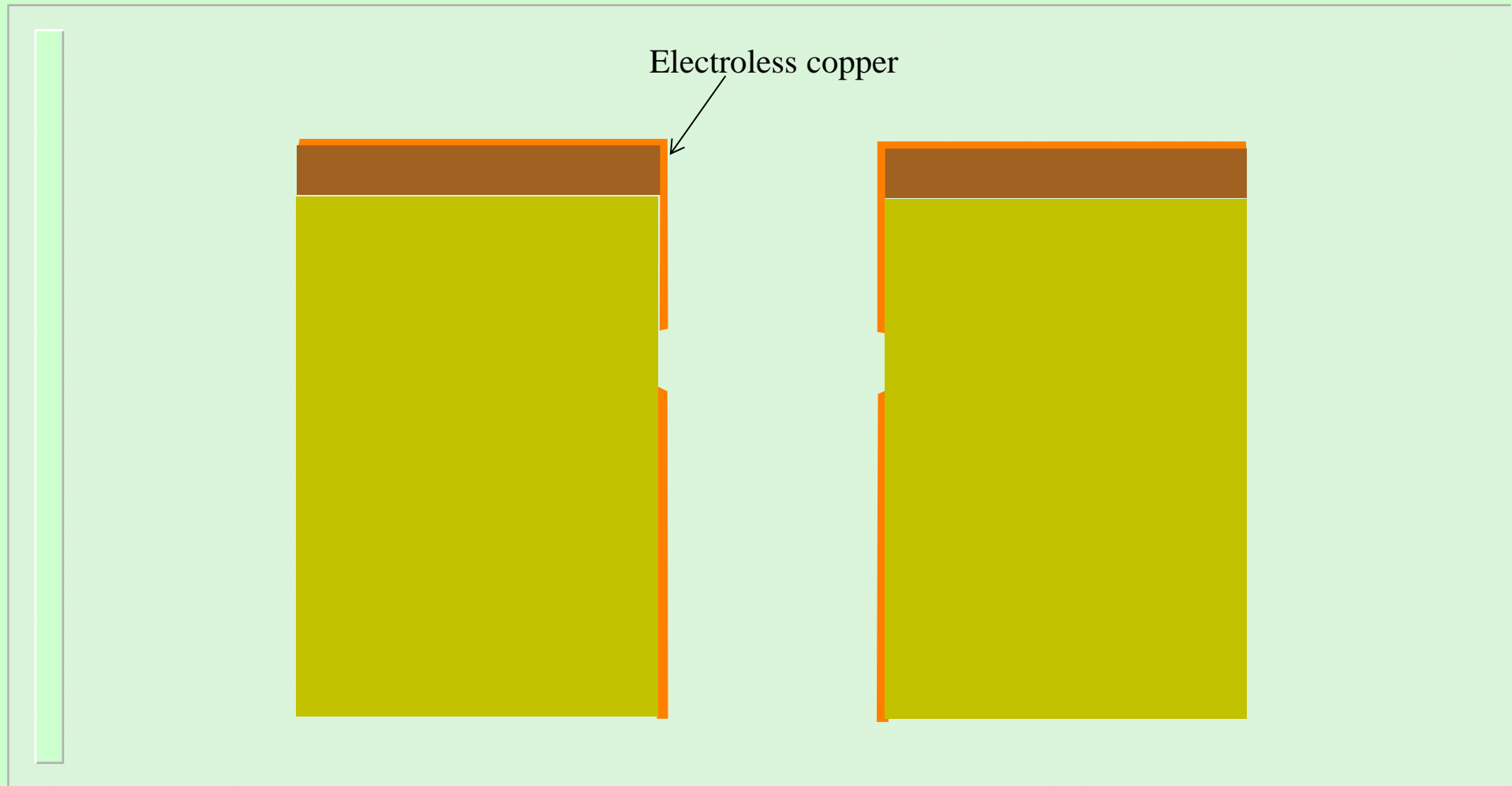
# Example loose glass fibers

(after drilling and plating)



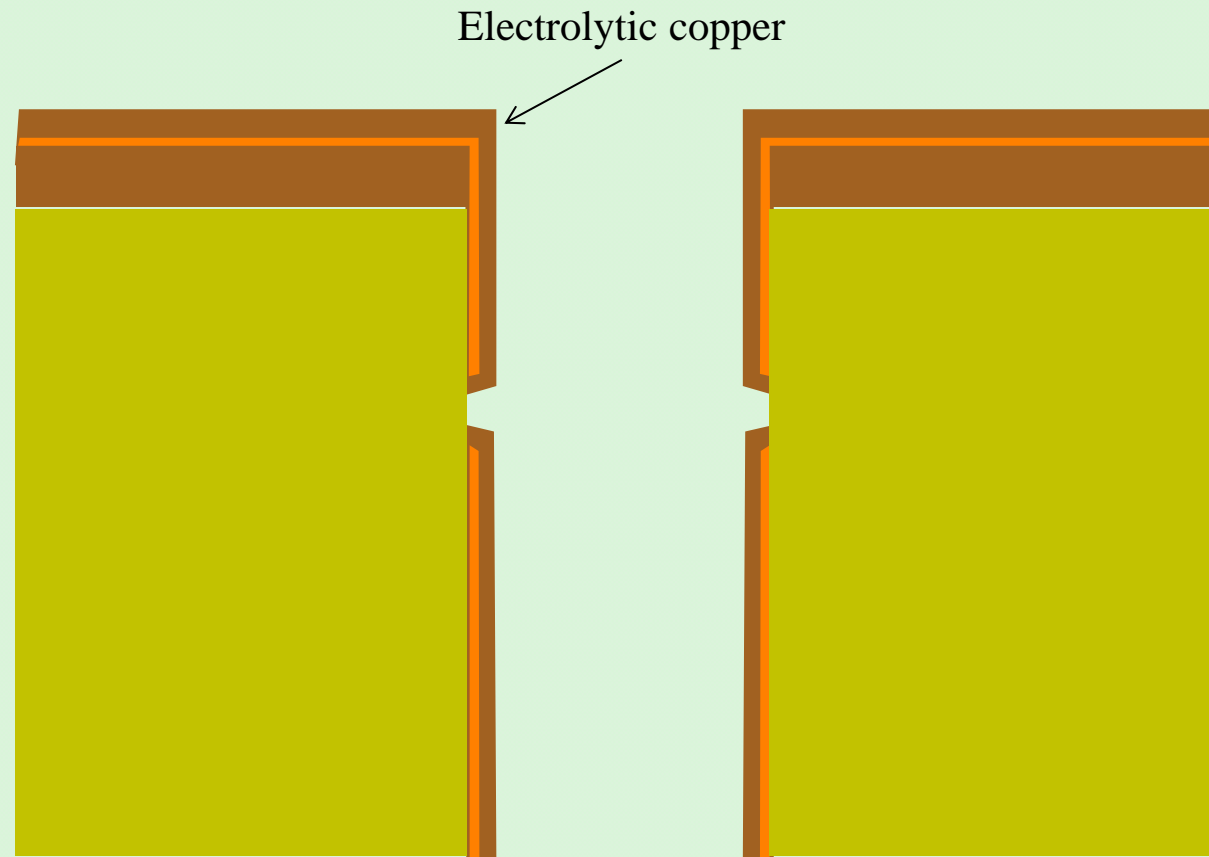
# Example plating process with defect

(Ring void)



# Example plating process with defect

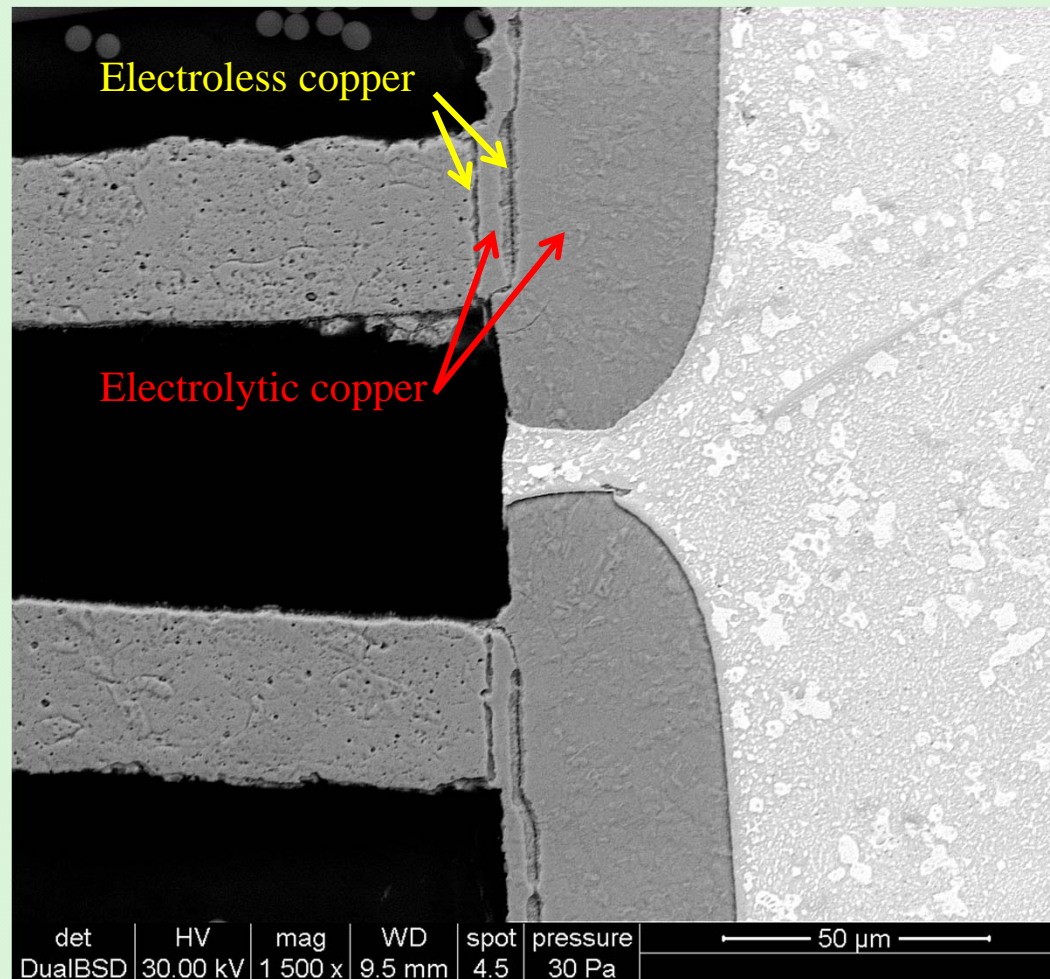
(Ring void)





# Example plating defect

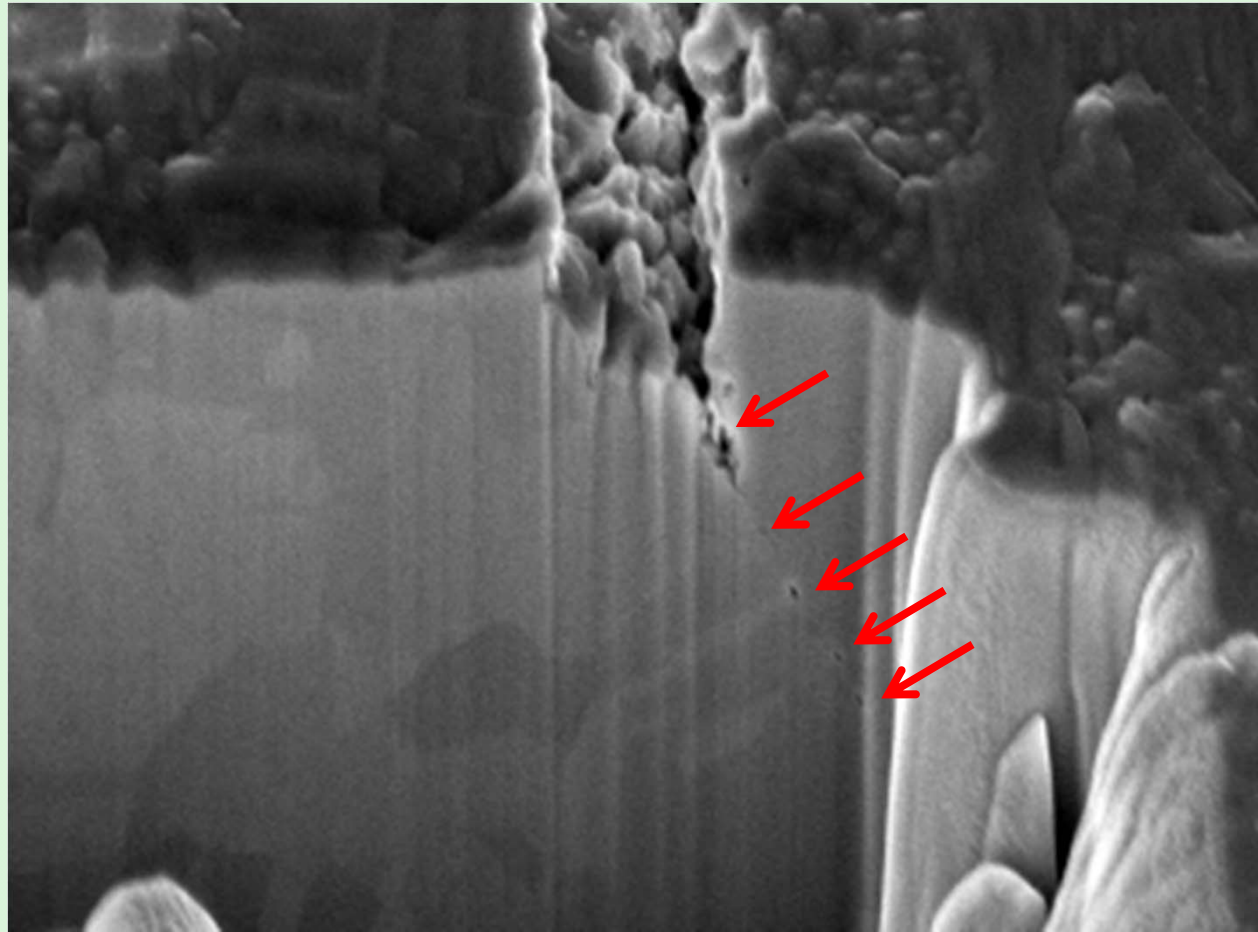
(Ring void)





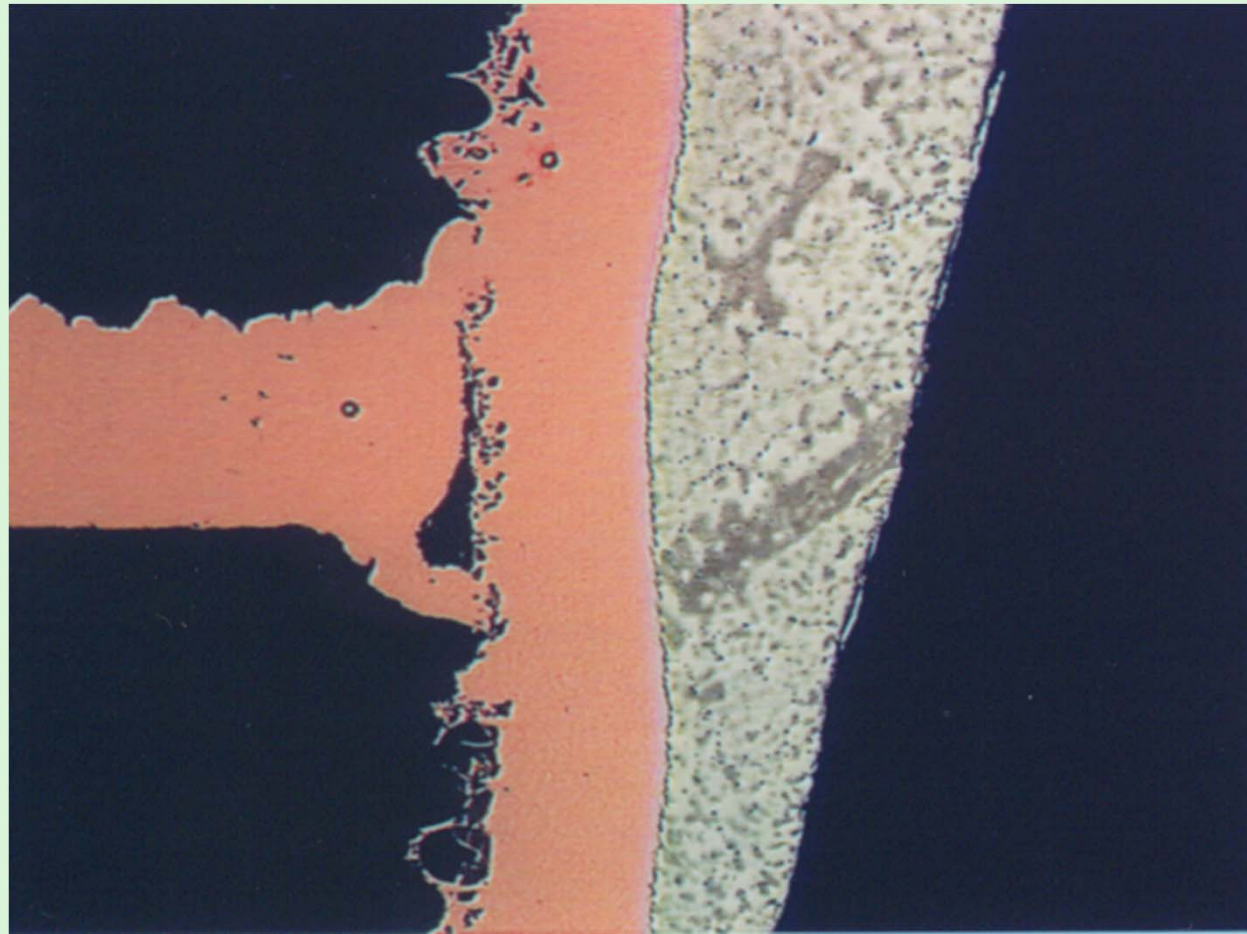
# Example plating defect

(Electroless copper process)



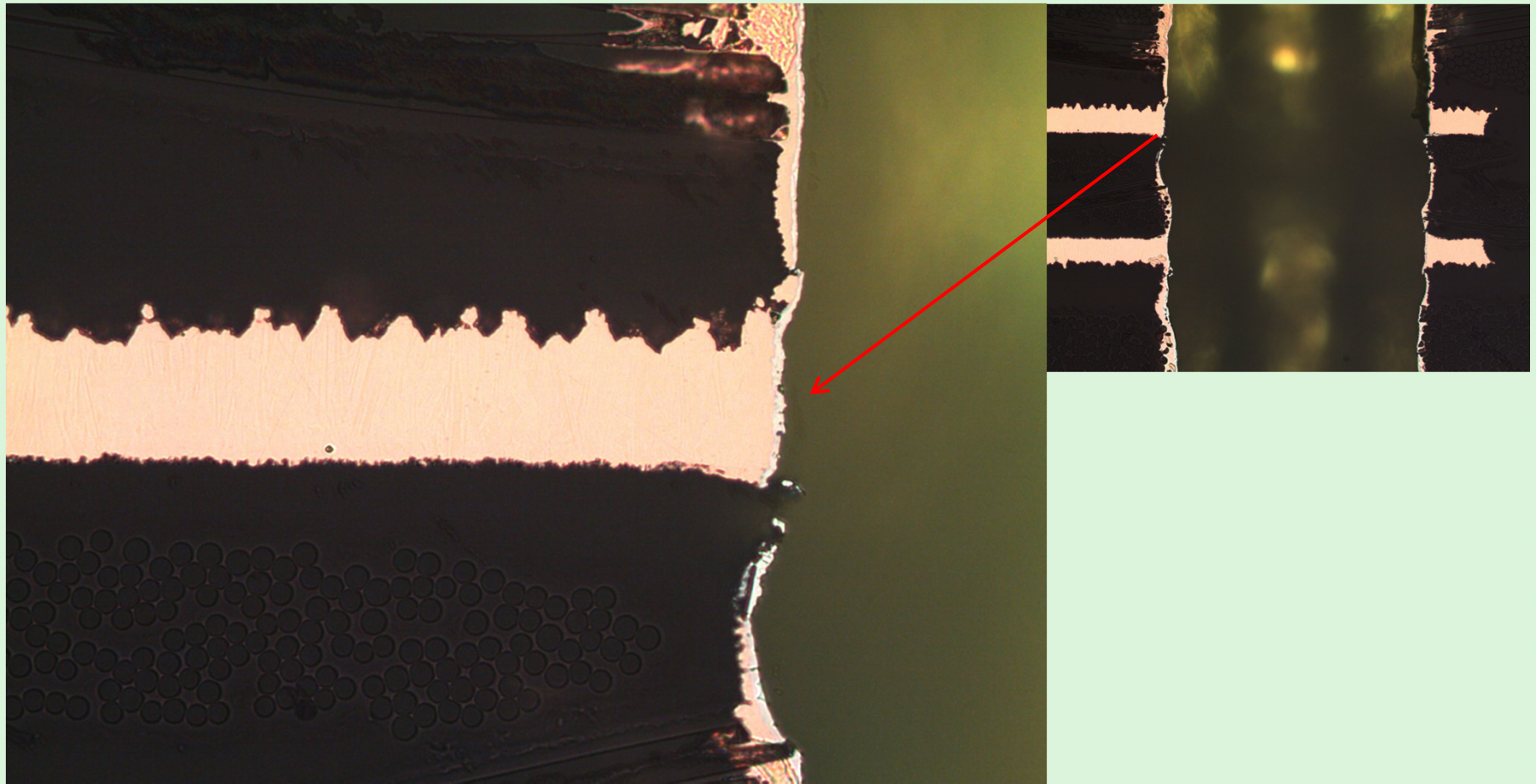
# Example plating defect

(Separation/Contamination between inner layer and hole plating)



# Example plating defect

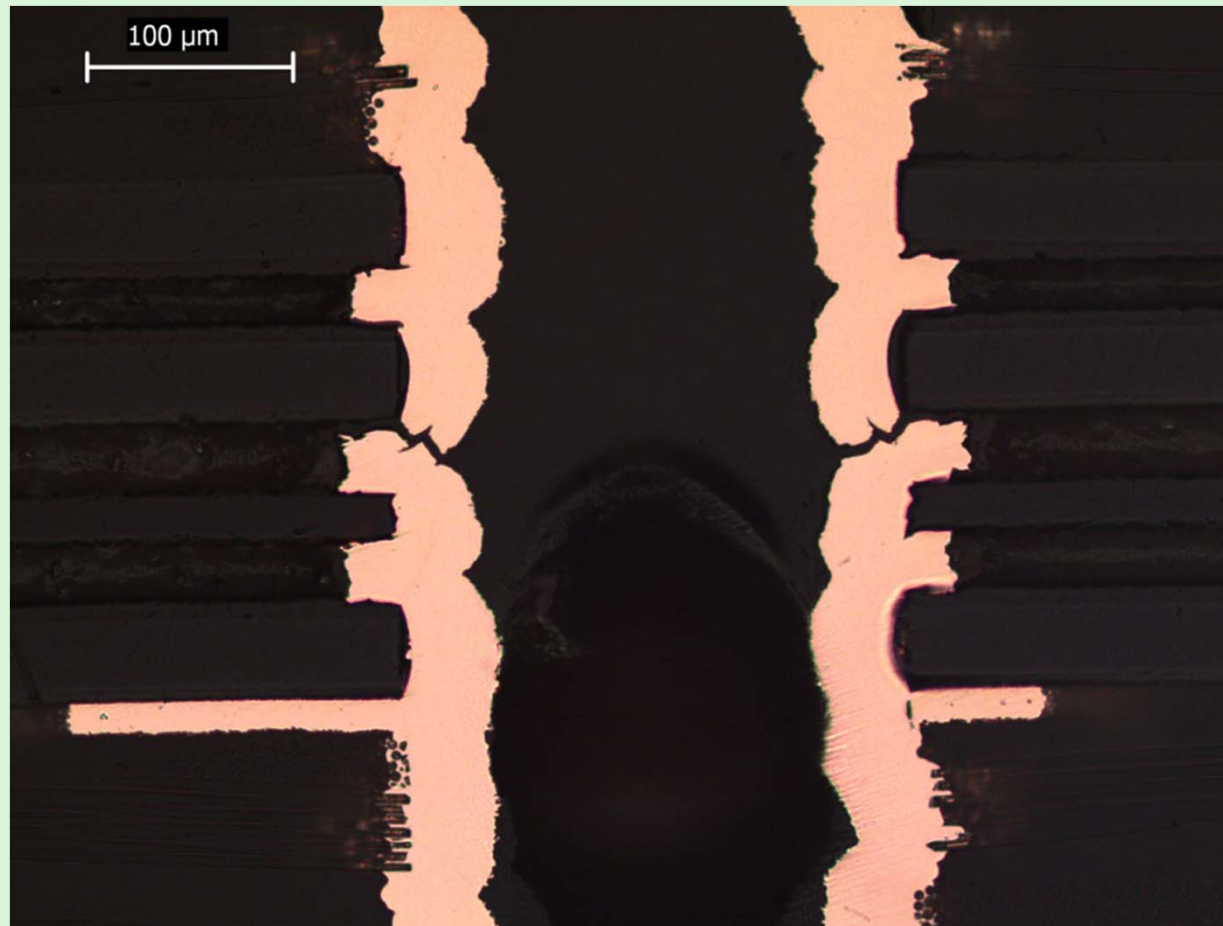
(Insufficient Contamination between inner layer and hole plating)



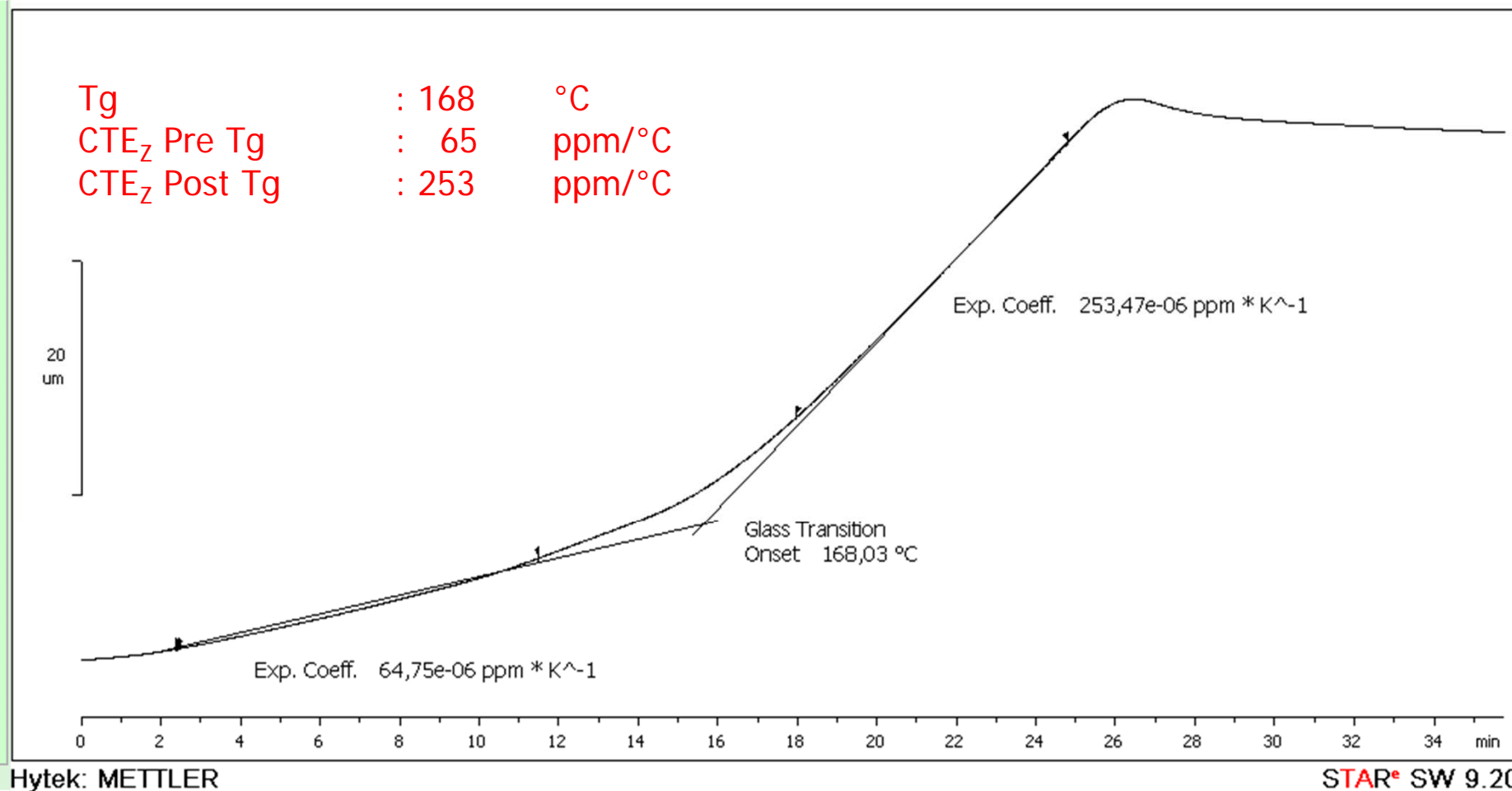


# Example plating defect

(Barrel crack)



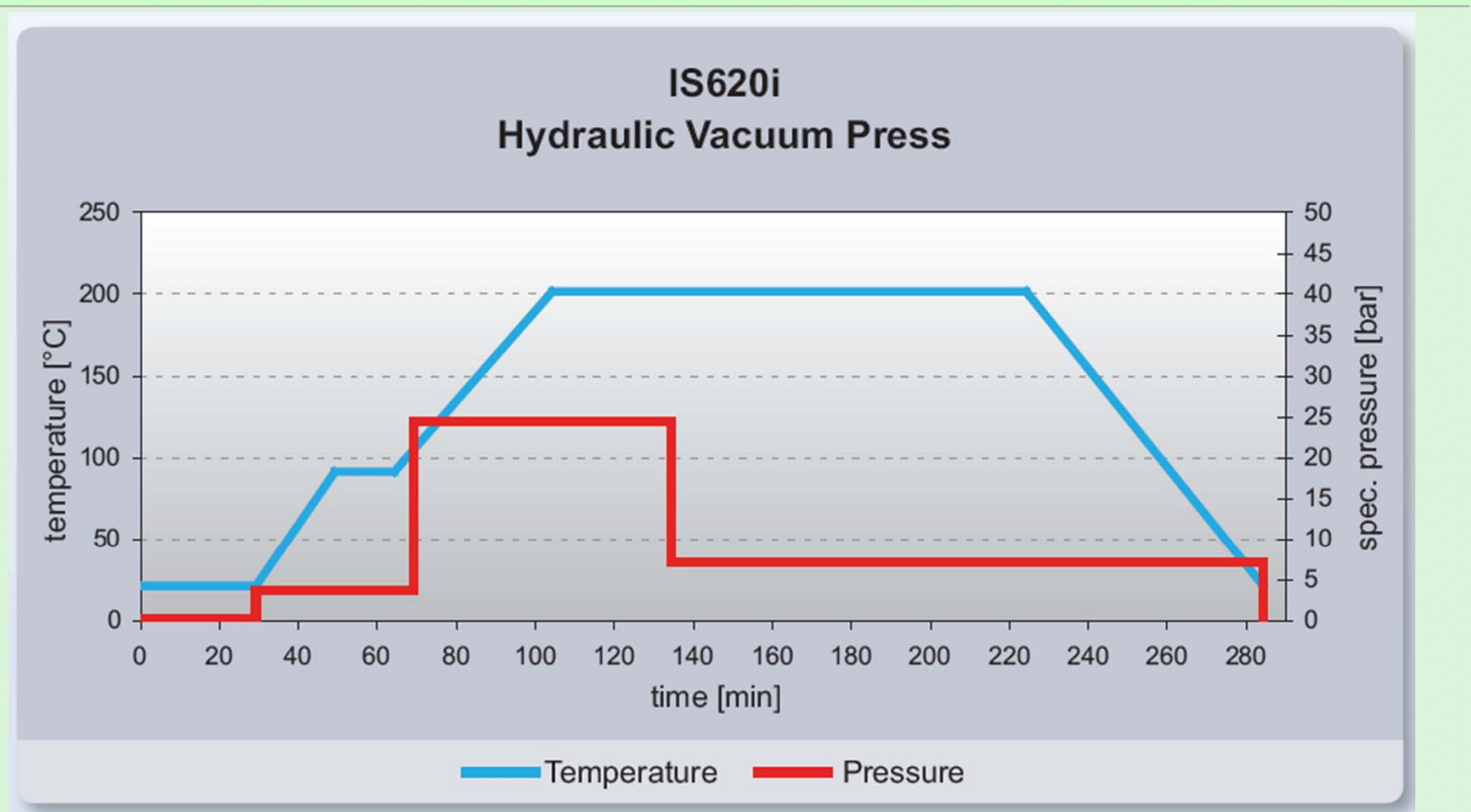
# Example Tg and CTE measurements





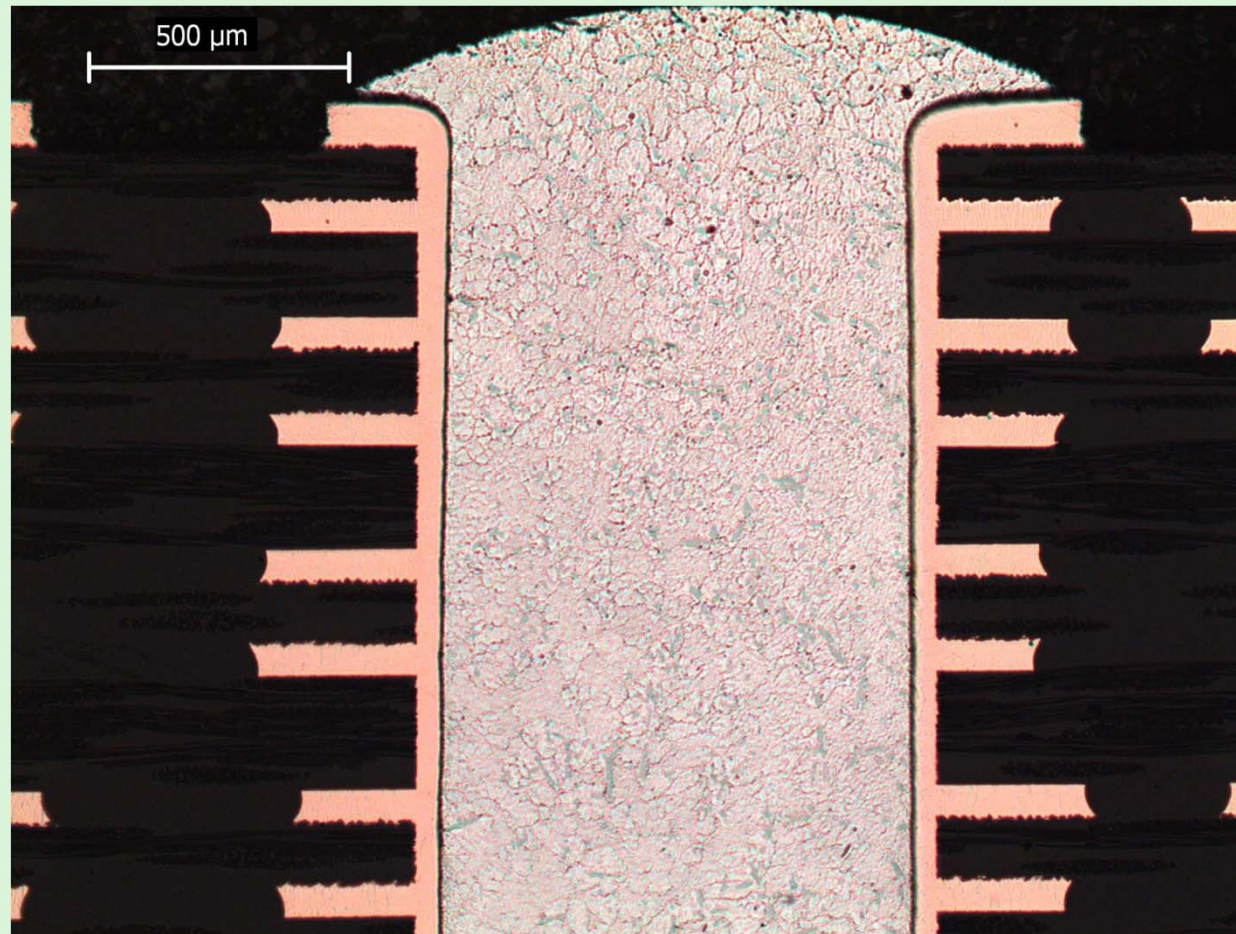
# Example press parameters

(Isola)



# Example acceptable plating

(After thermal stress test at 288°C/10 sec.)



# Summary

- To minimize the risk for ICD it must be assured that all process parameters are in control:
  - Resin cure
  - De-smear process
  - Cleaning/rinsing/etch process
  - Activator process
  - Electroless plating process
- Use **real** SPC (Statistical Process Control) in all processes
  - Water quality/treatment
  - Chemicals
  - Machines
- “Know how” of personnel
  - Highly skilled process and chemical engineers
  - Highly skilled laboratory technicians
  - Highly skilled operators

