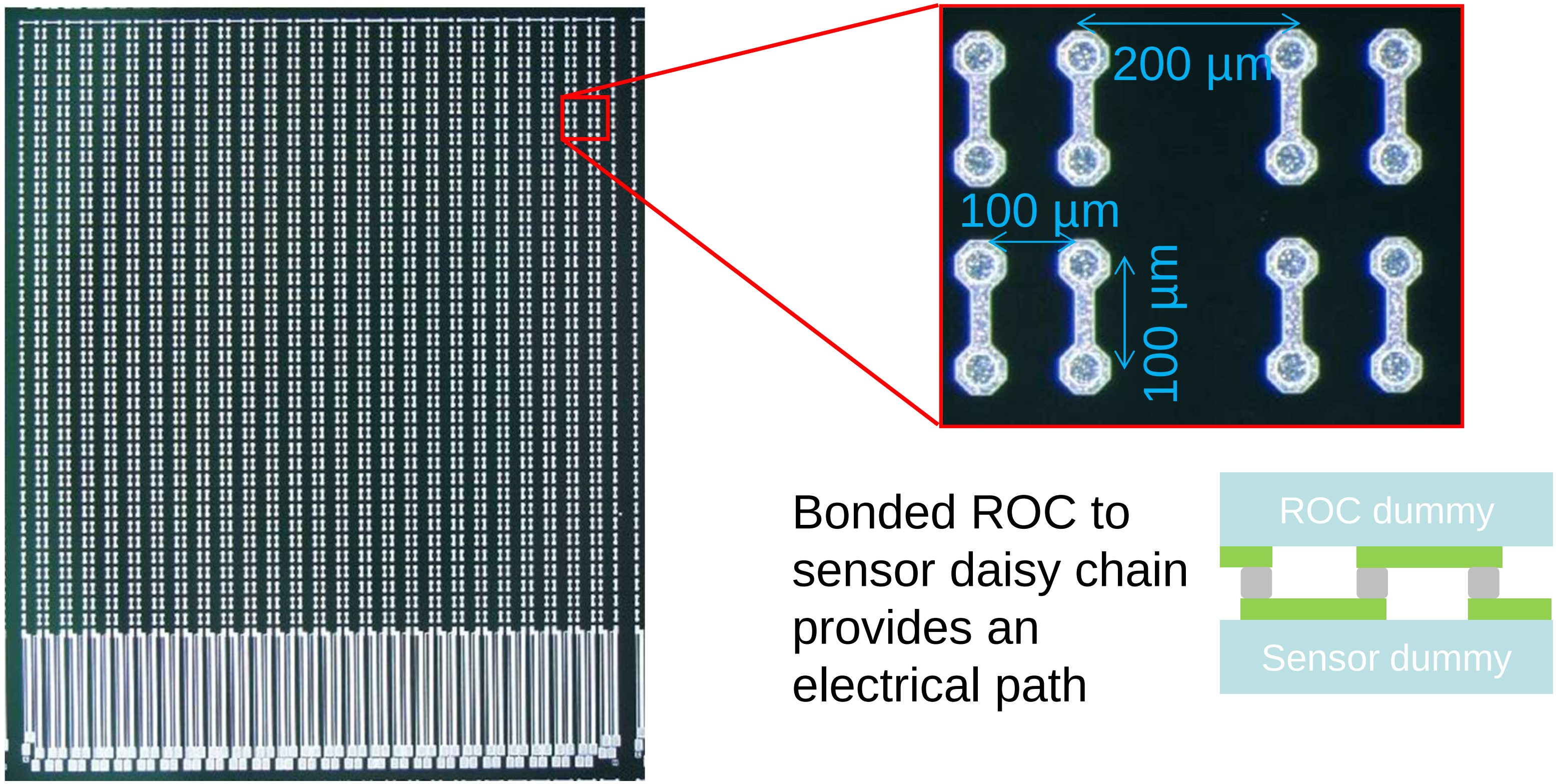
Dummy-ROC is identical in pad count and pad pitch to real ROC but is designed as a daisy chain structure

MICROGRAPH OF THE WHOLE CHIP LAYOUT AND ZOOM TO DAISY CHAIN PADS

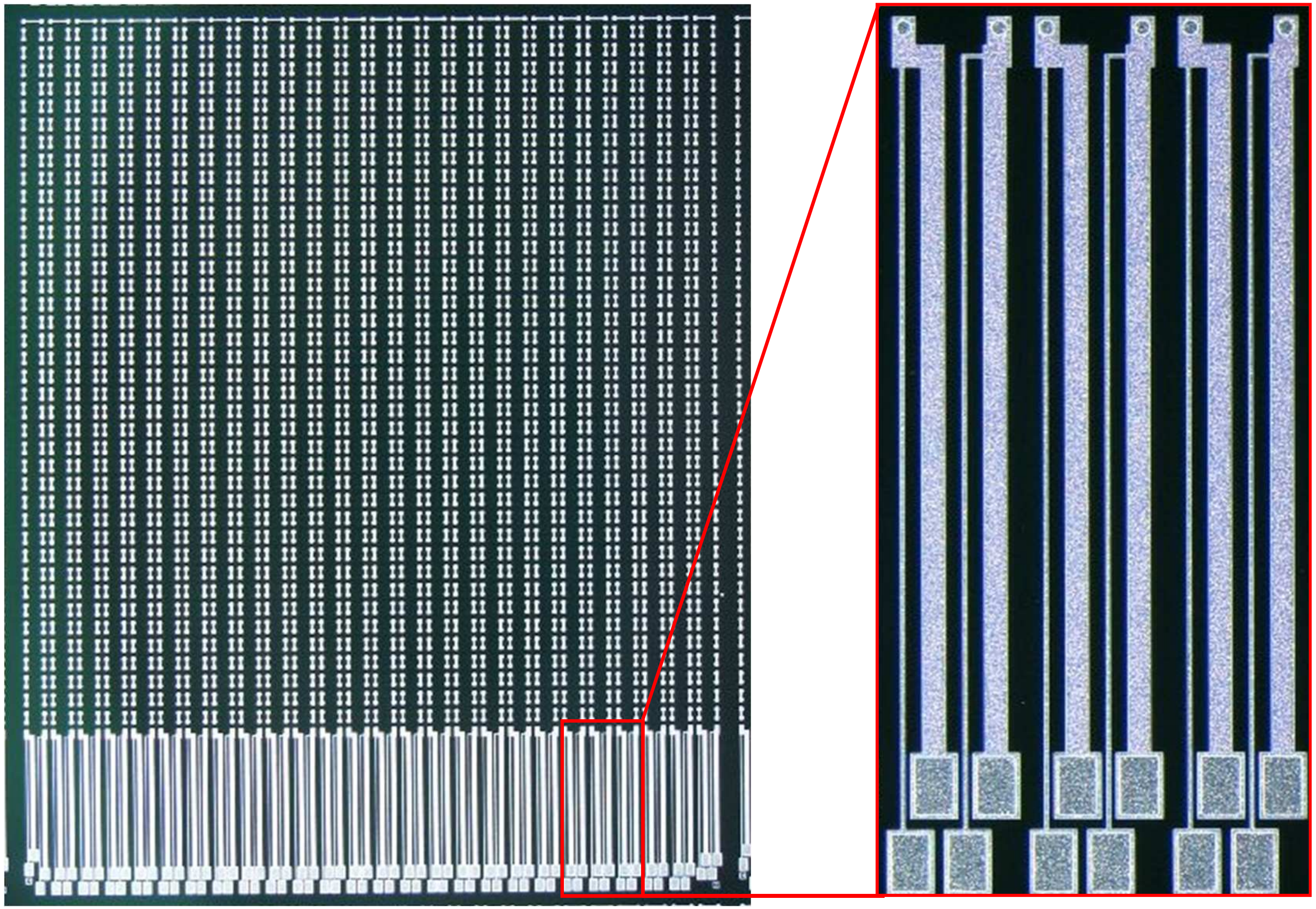


Bonded ROC to sensor daisy chain provides an electrical path

Row pitch = 100 µm
Column pitch = 150 µm (cells of columns with odd numbers are mirrored)
Pad metal = 50 µm
Passivation opening = 30 µm

Each DC is connected with four larger pads for signal application and sensing

MICROGRAPH OF THE WHOLE CHIP LAYOUT AND ZOOM TO CONNECTOR PADS



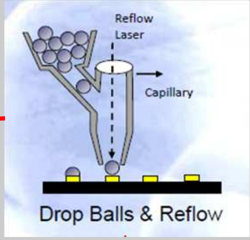
Solder bumps were placed and reflowed successfully

PLANNED PROCESS AND LASER SCAN AND OPTICAL MICROSCOPE PICTURES

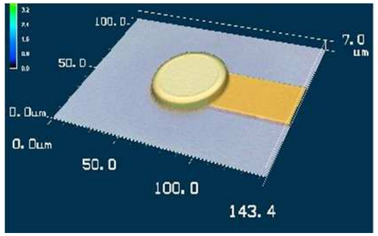
Planned and tested Solder Ball Jetting process

UBM at Pac Tech

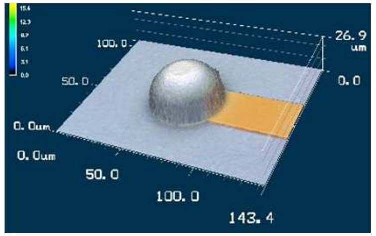
SB^2 Jet



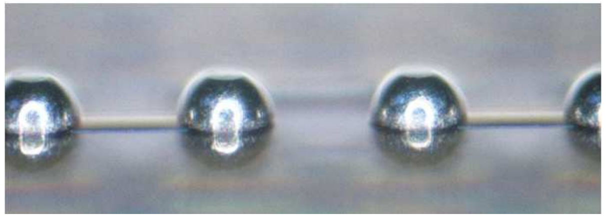
Jetting 40 µm Solder Balls



Pad with processed UBM



Pad bumped with 40 µm solder ball

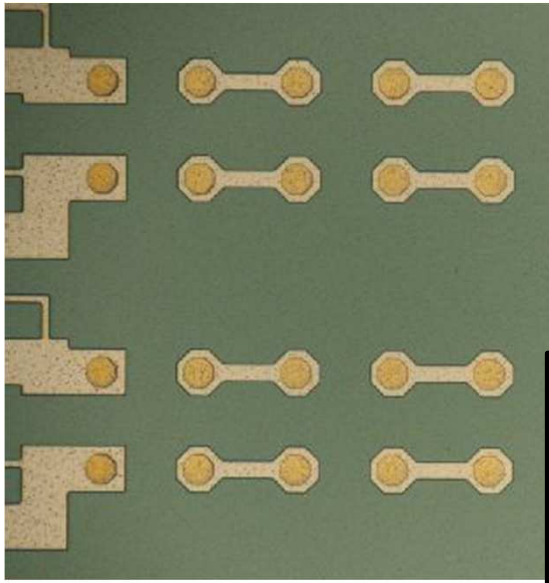


Side view of bumbed daisy chain structure on chip

First solder placement tests were successful with SB^2 solderball jet

MICROGRAPHS OF DUMMY-ROC

Before

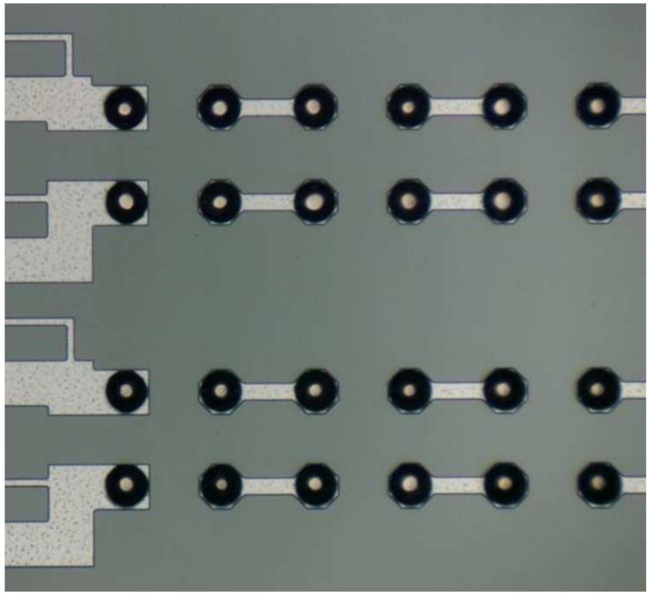


Dummy-ROC with UBM

ENIG UBM:
40 µm diameter
5 µm nickel
50 nm gold

Probe pads with UBM

After



Dummy-ROC after solder placement

40 µm diameter solder balls

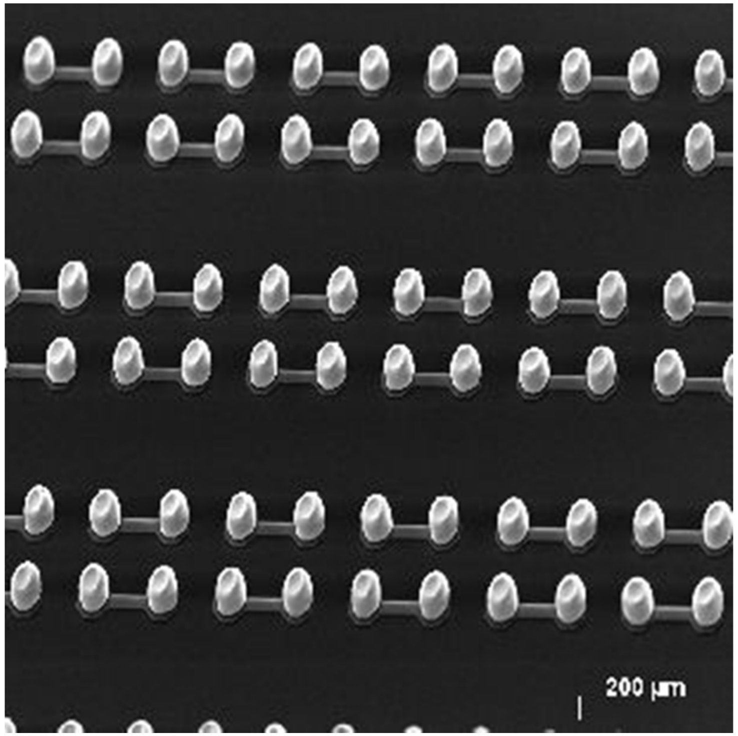
The difference between soldered and unsoldered is visible with the naked eye

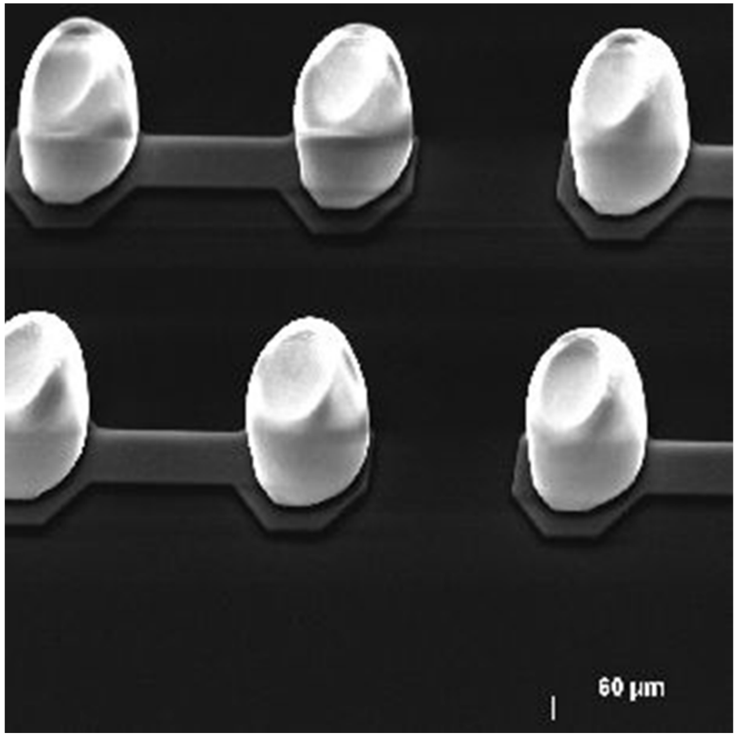
PHOTOGRAPH OF DUMMY-SENSORS

Solder placement accidentally unfinished

Placed bumps are not spherical but nonuniformly shaped

SEM PICTURES OF WAFER #17 (DUMMY ROC)



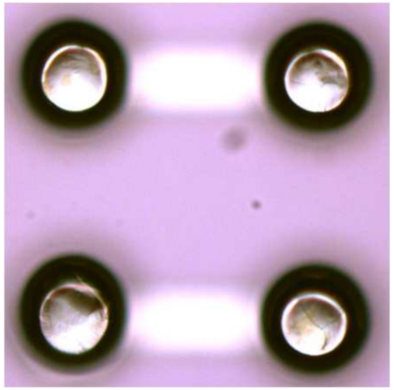


Jetting N_2 flow → aslant crater on top
Very quick solidification → irregular shape
→ not centered position

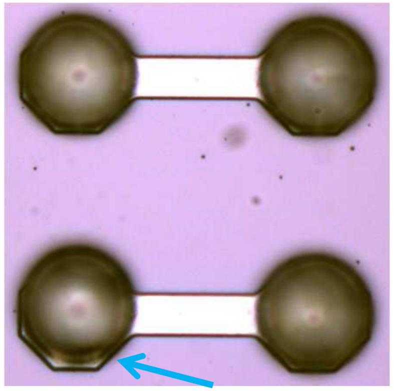
Laser reflow in formic acid chamber of LaPlace works fine

MICROGRAPHS OF A SENSOR DUMMY PADS BEFORE AND AFTER REFLOW

After solder placement



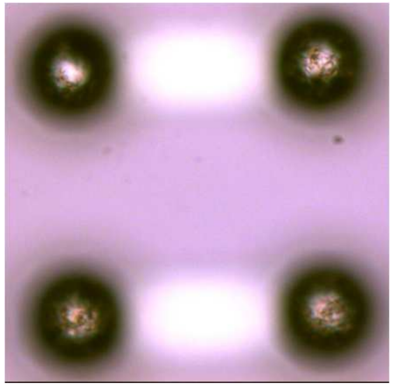
Crater on top



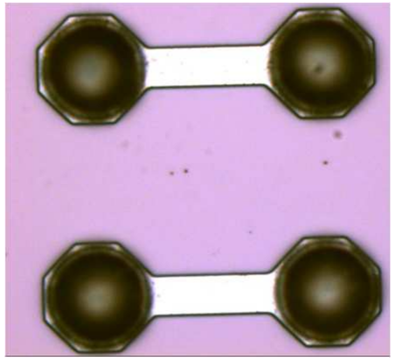
Slightly off-centered

Reflow
(10 sec. / formic
acid atmosphere)

After insitu reflow



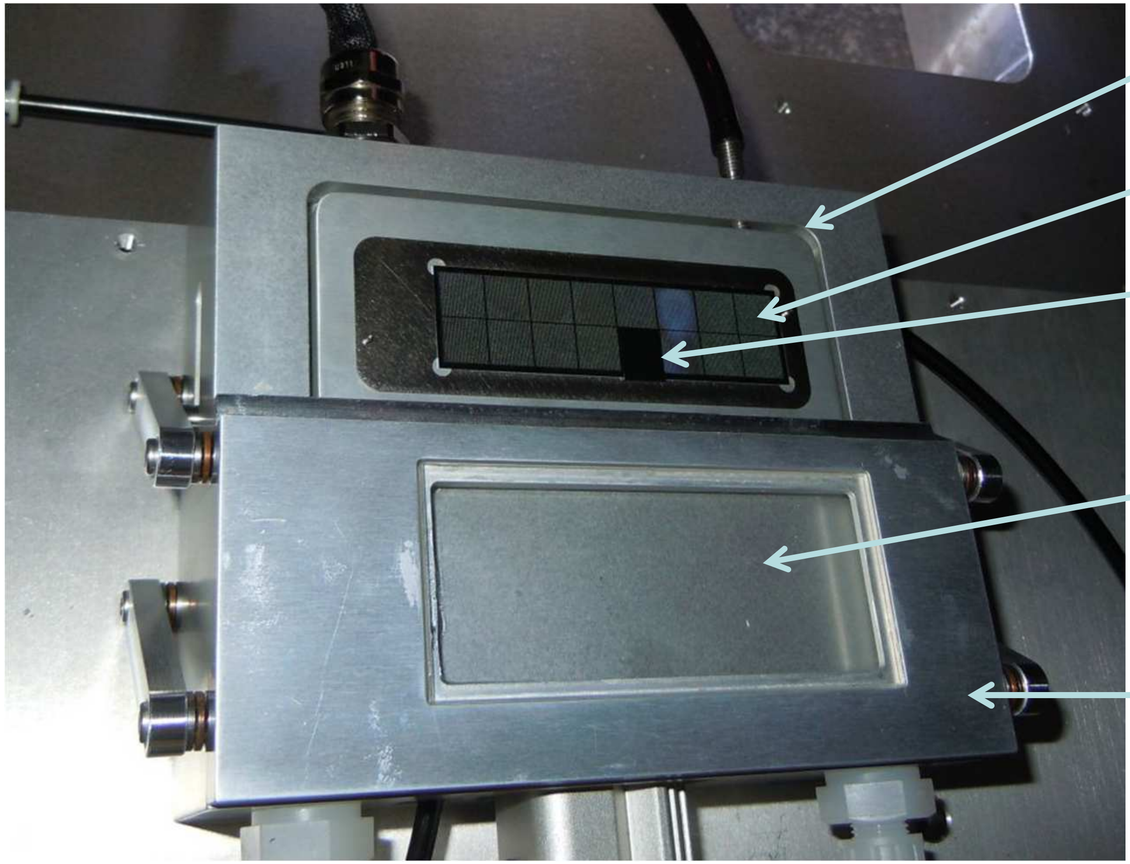
Spherical top /
regular shape and height



Self-aligned

Formic acid chamber of LaPlace works fine

PICTURE OF THE CHAMBER DURING BONDING PROCEDURE



Groove for gas inlet and exhaust

Bumped sensor

Tacked ROC

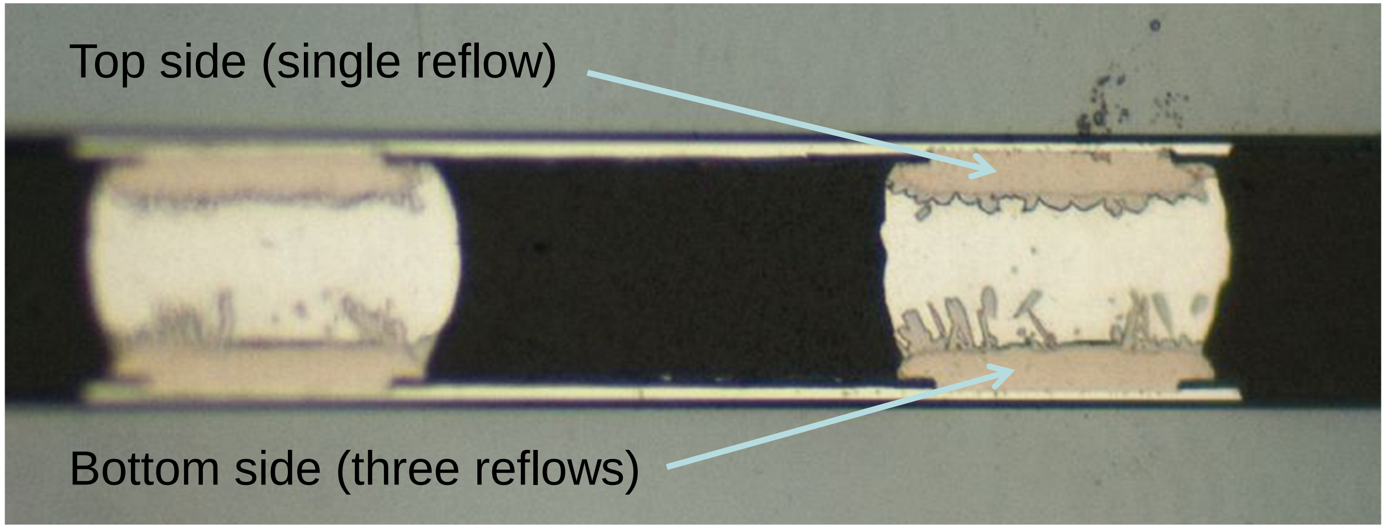
Special glas for high infrared transmission

Sealed automatic cover (open)

LaPlace formic acid chamber (open, with dummy sensor)

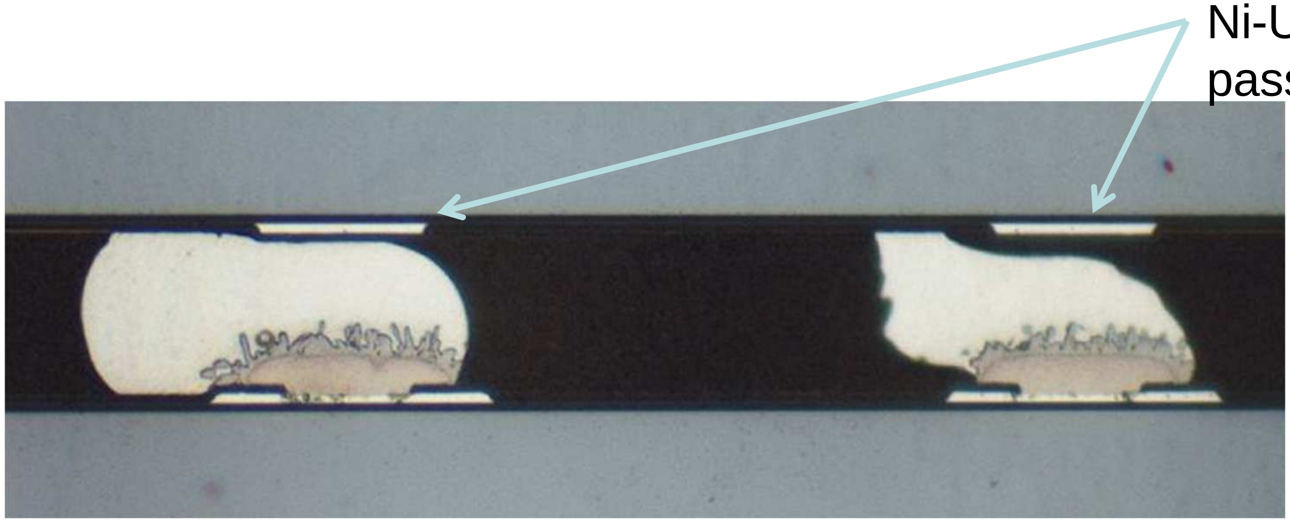
Preliminary ROC to ROC bonding results are encouraging

CROSS SECTIONAL VIEWS TO BONDED DUMMY ROCS



CiS production failure lead to several still passivated pads

CROSS SECTIONAL VIEWS TO BONDED DUMMY ROCS



Pads without electroless Ni-UBM and residual pad passivation

Affected pads:

- Are smaller
- Lack of UBM
- Cannot be wetted by solder