UNIVERSITÄT
HEIDELBERG

Solder Bumping

Schaltungstechnik
und Simulation

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and Applications

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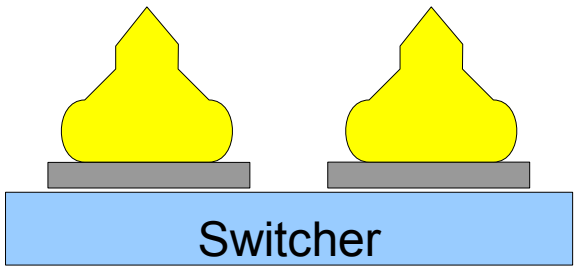
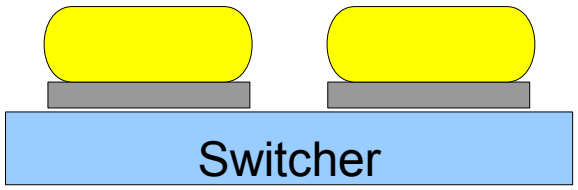
Single Chip Solder Bumping

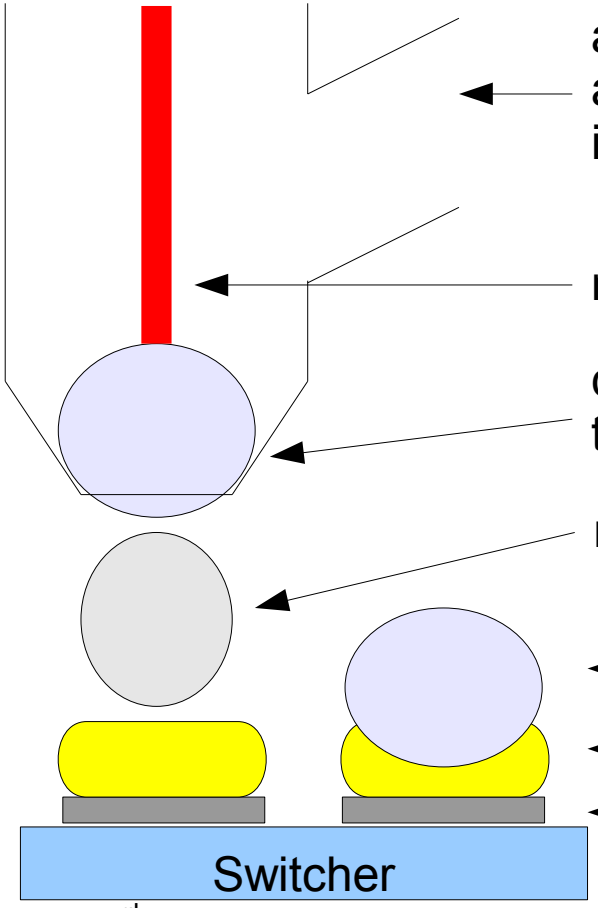
- use coined gold studs as an under bump metallization
- place solder bumps ontop using PacTec solder jetting technology
  - 60µm minimum ball size available
  - SnAgCu solder
  - Pb-free



1st : place goldstud



2nd : coin gold studs



3rd : jet solder balls

apply nitrogen pressure and feed single balls into capillary

melt ball with laser

capillary hole smaller then solder ball

melted ball „spit“ out

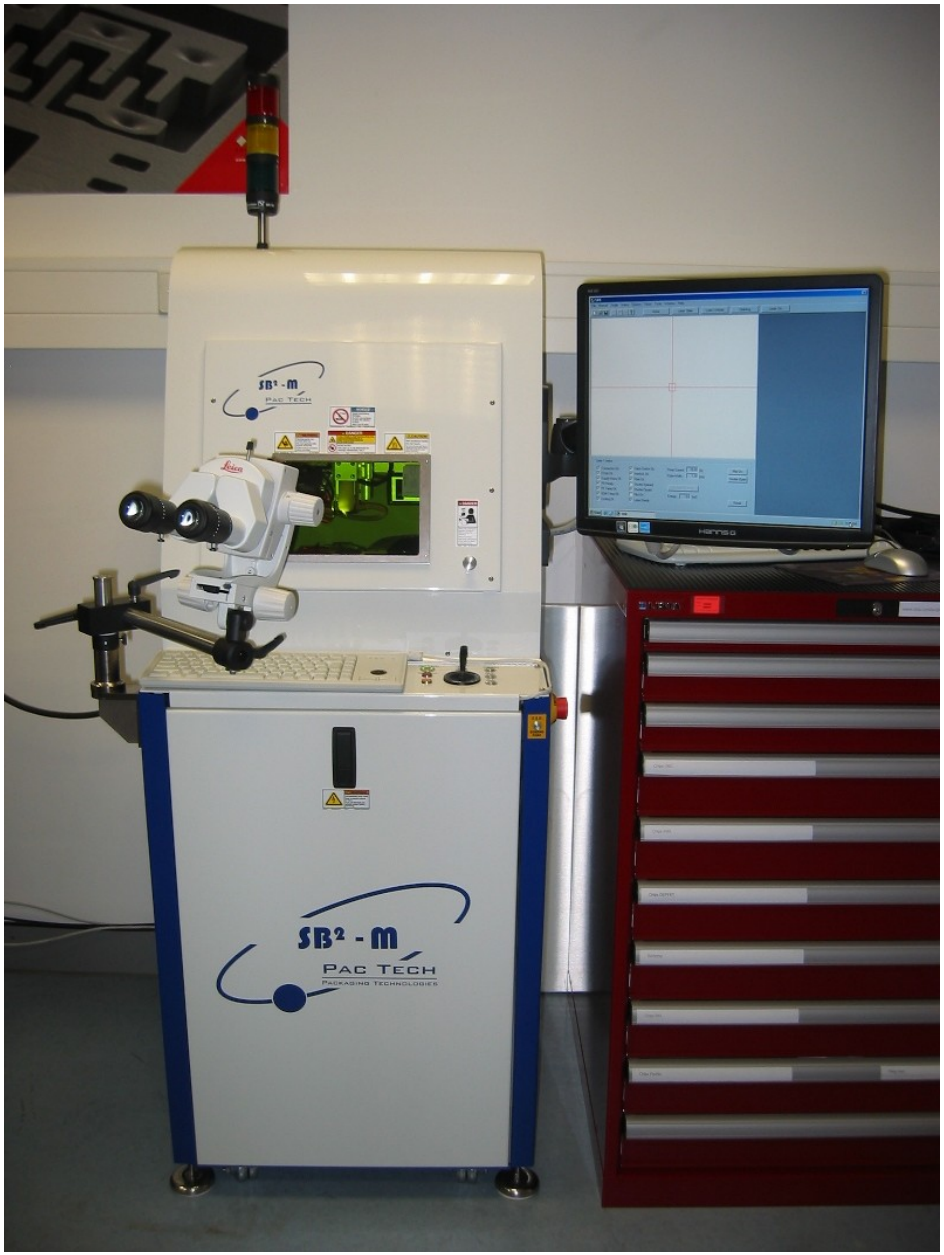
Solder ball

Au-bumps

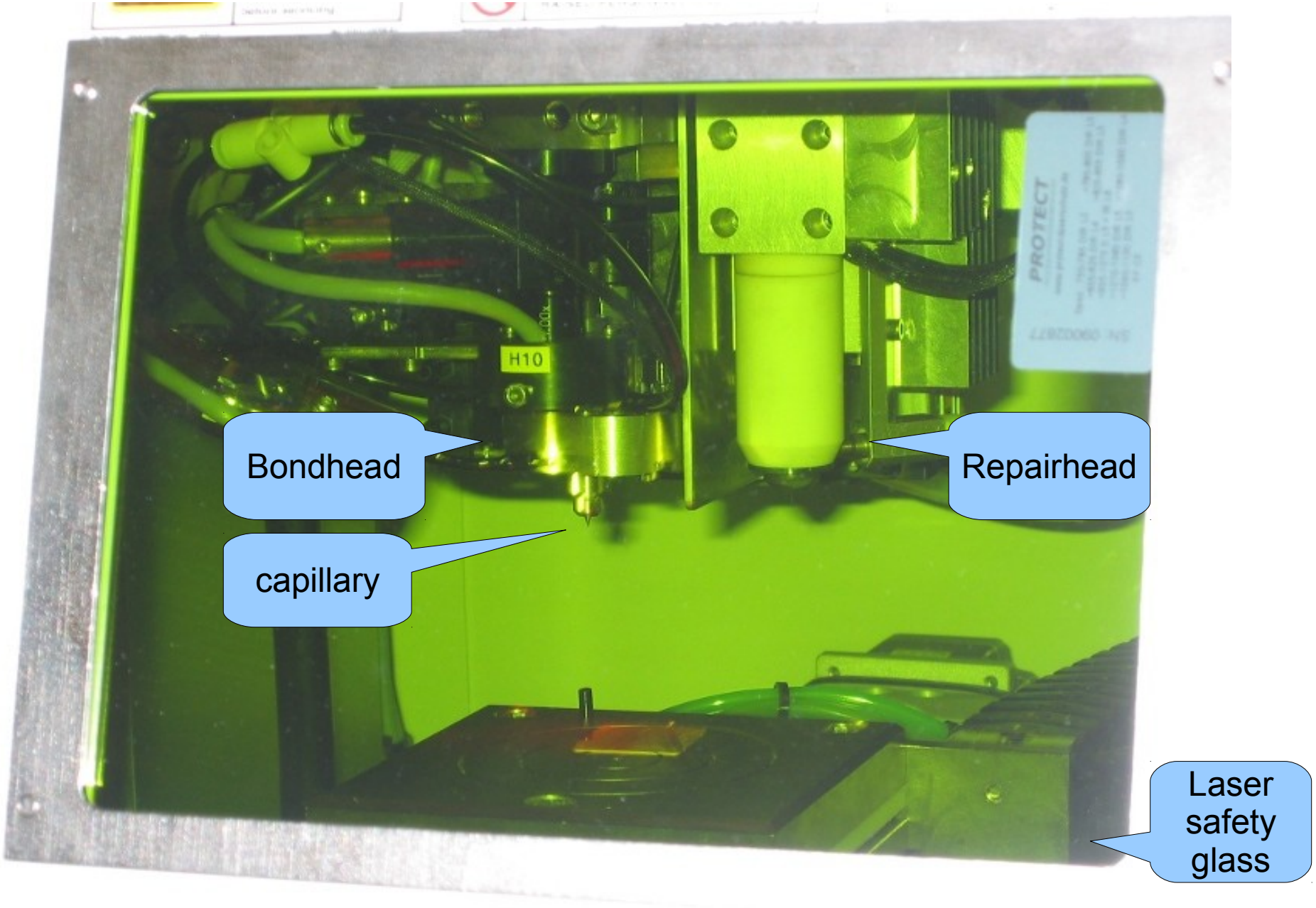
Al-pads

PacTec SB2-M

- can deposit single solder balls
- 60µm solderballs SnAgCu
- max. 5 balls/sec
- melts ball with 20W IR laser

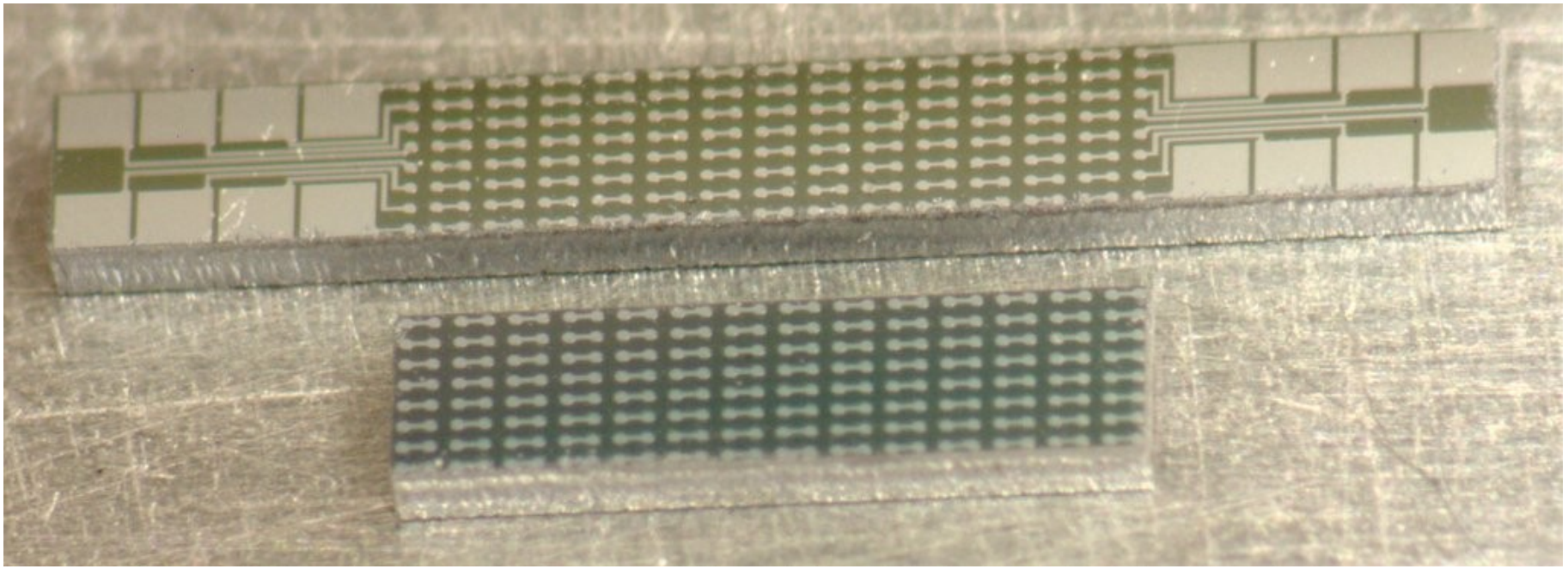


Bond- and Repairhead



DCD2 dummy chips

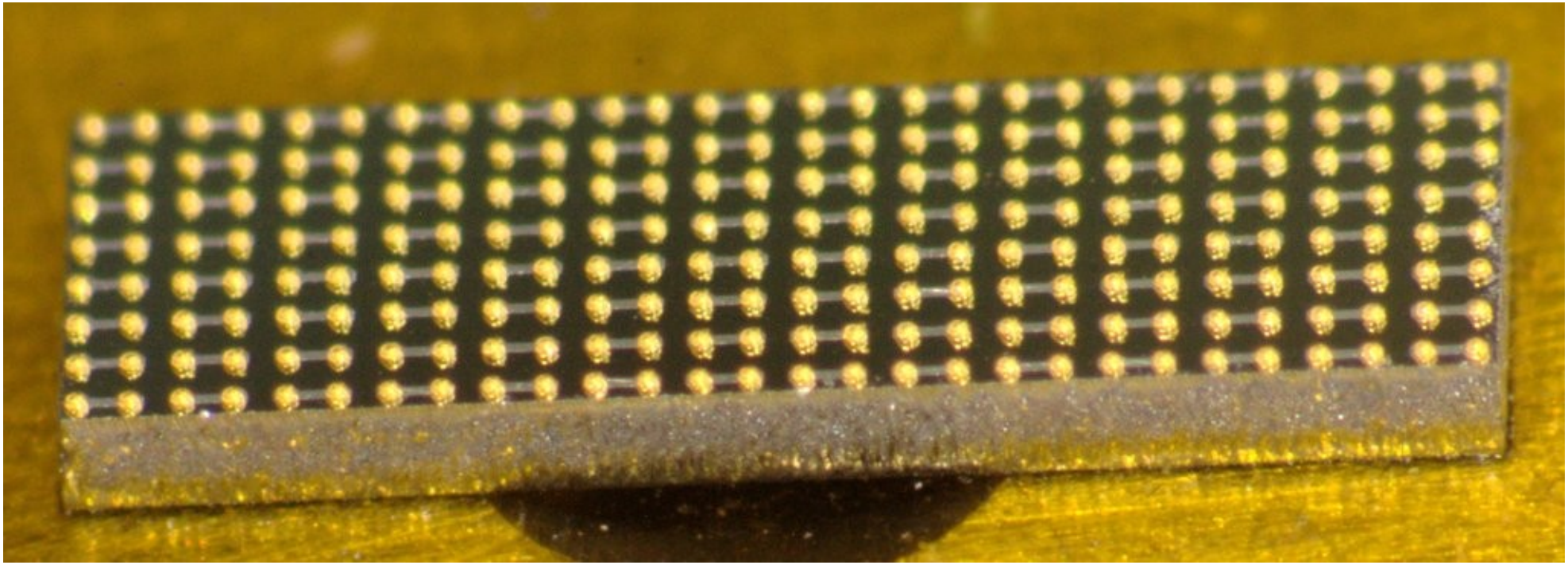
- DCD2 dummy chips used for tests (old production)
- snake structures with 28 bumps
- 8 snakes per chip
- used previously for goldstud flipping tests



DCD dummy chip and substrate
224 pads

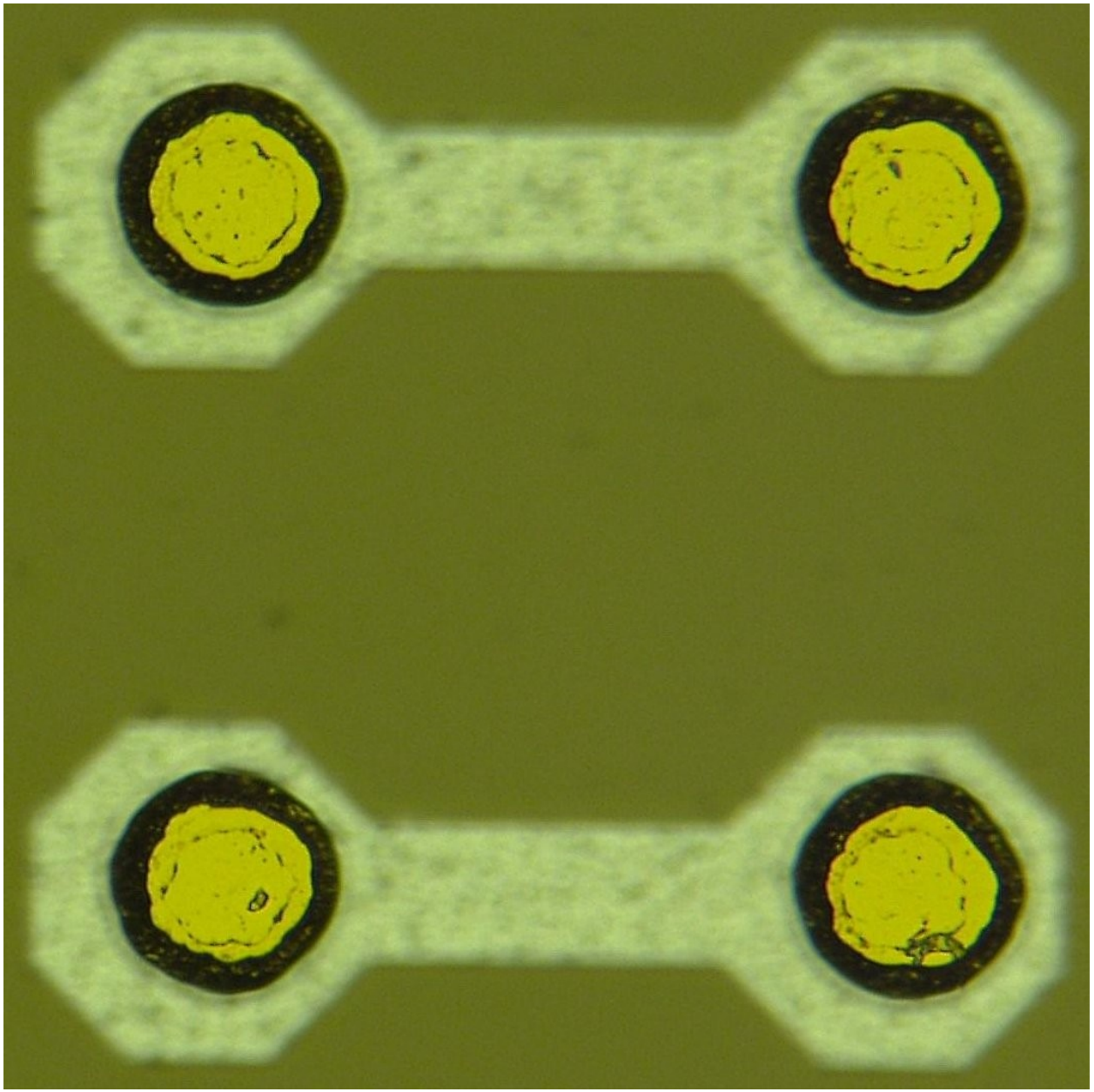
Gold Stud Bumping

- place gold studs on chip and substrate
- coin studs on chip to remove tail on top and create a flat surface
  - using flip-chip machine and big piece of silicon



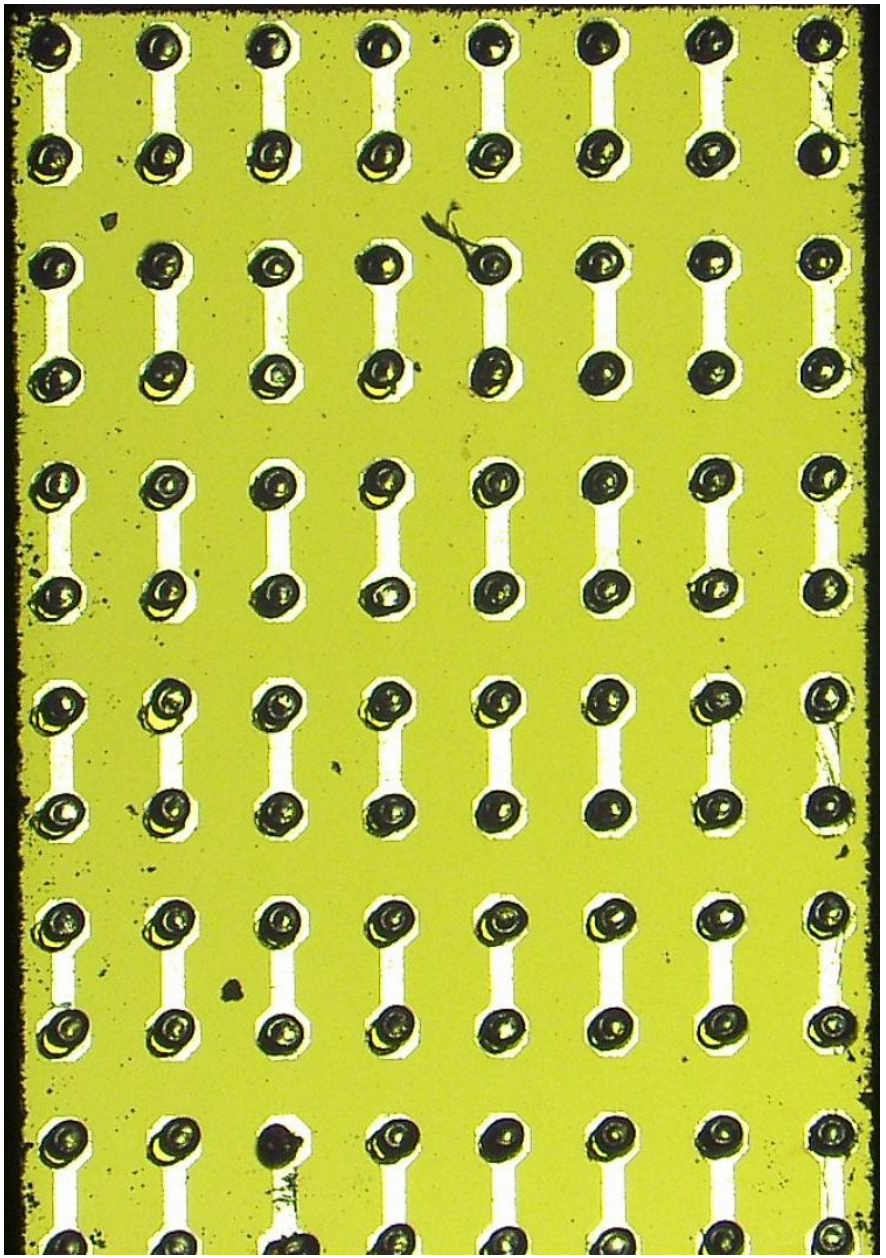
Gold Stud Dimensions

- 58µm bump diameter
- 42µm flat diameter



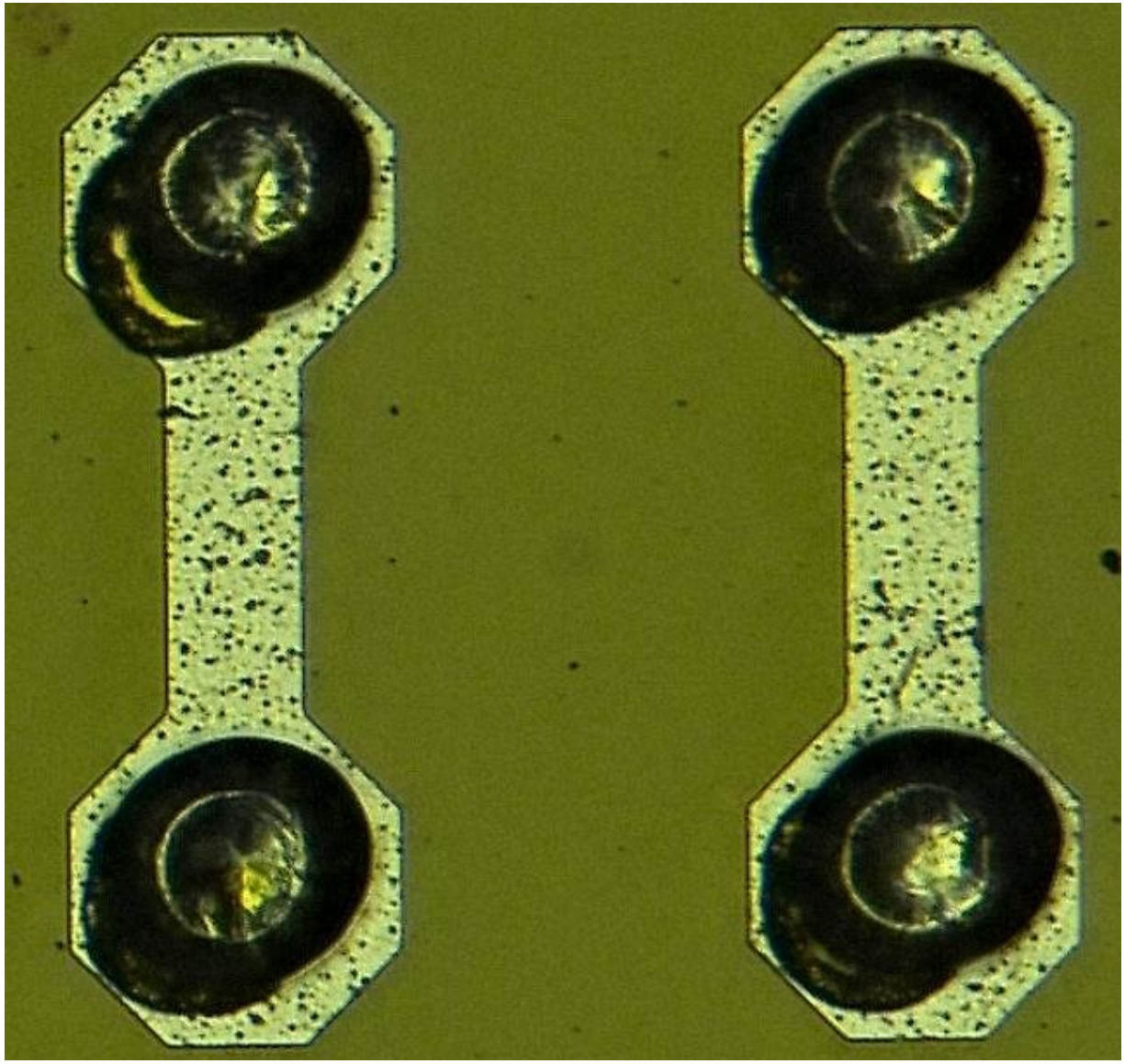
Automatic Solder Ball Placement

- software problems solved
  - could not open files
- first automatic ball placements done
- most balls centered on bumps
- need further optimization
  - nitrogen pressure
  - distance capillary<->bumps

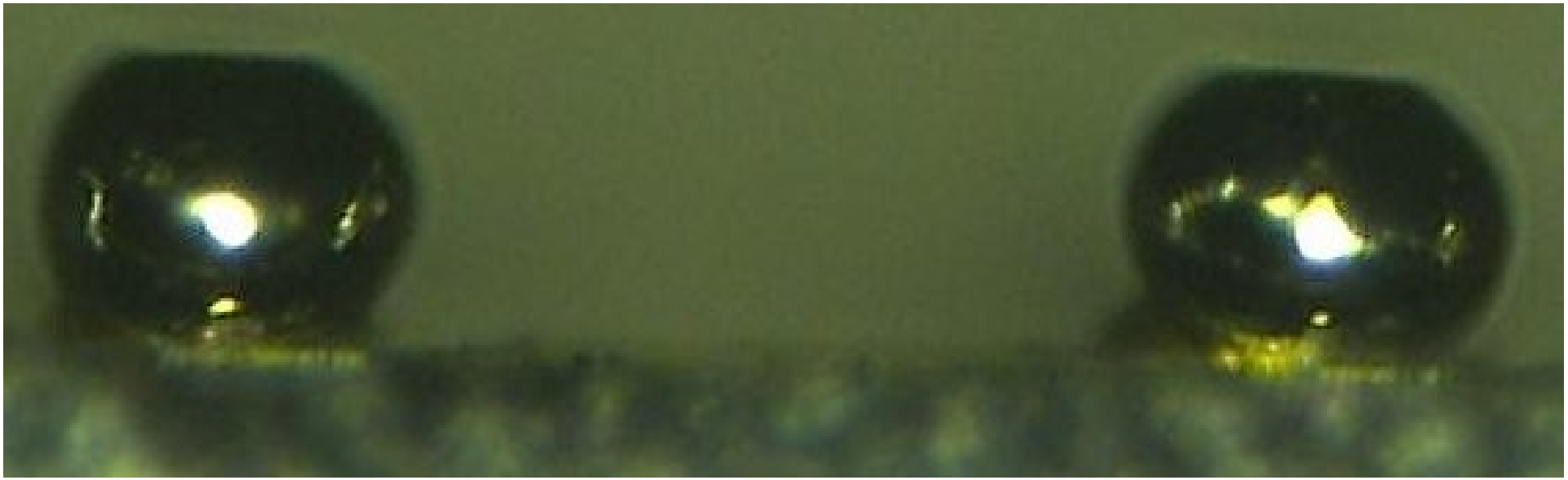


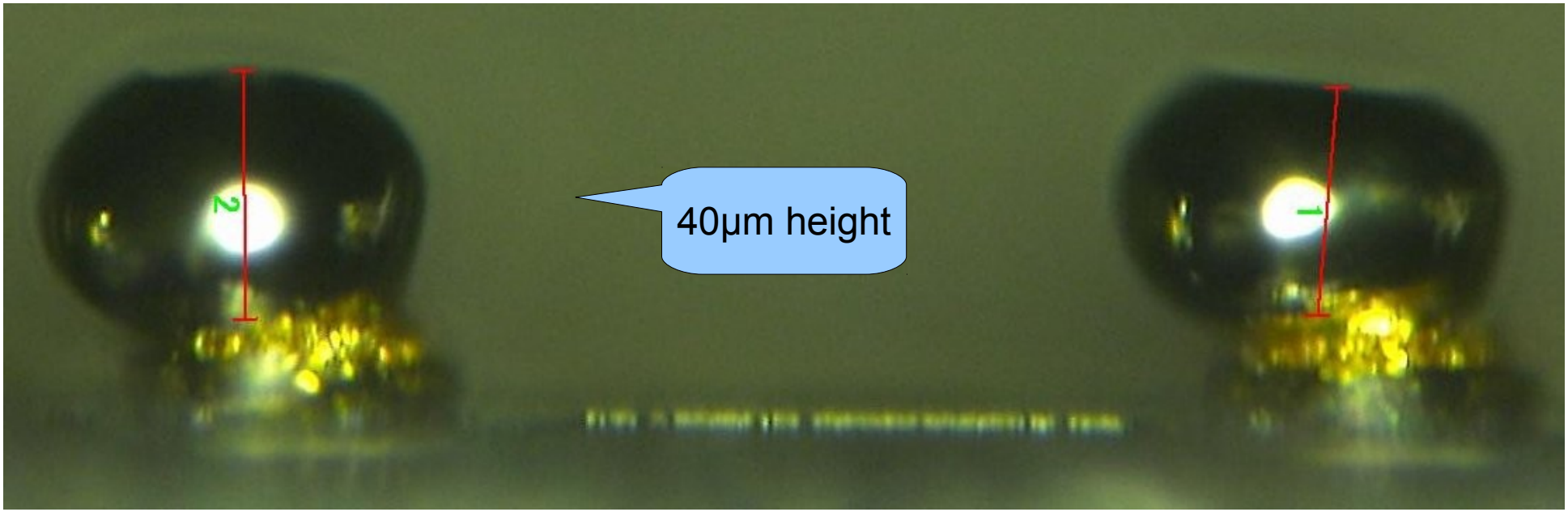
Solder Ball Dimensions

- ball diameter 67µm

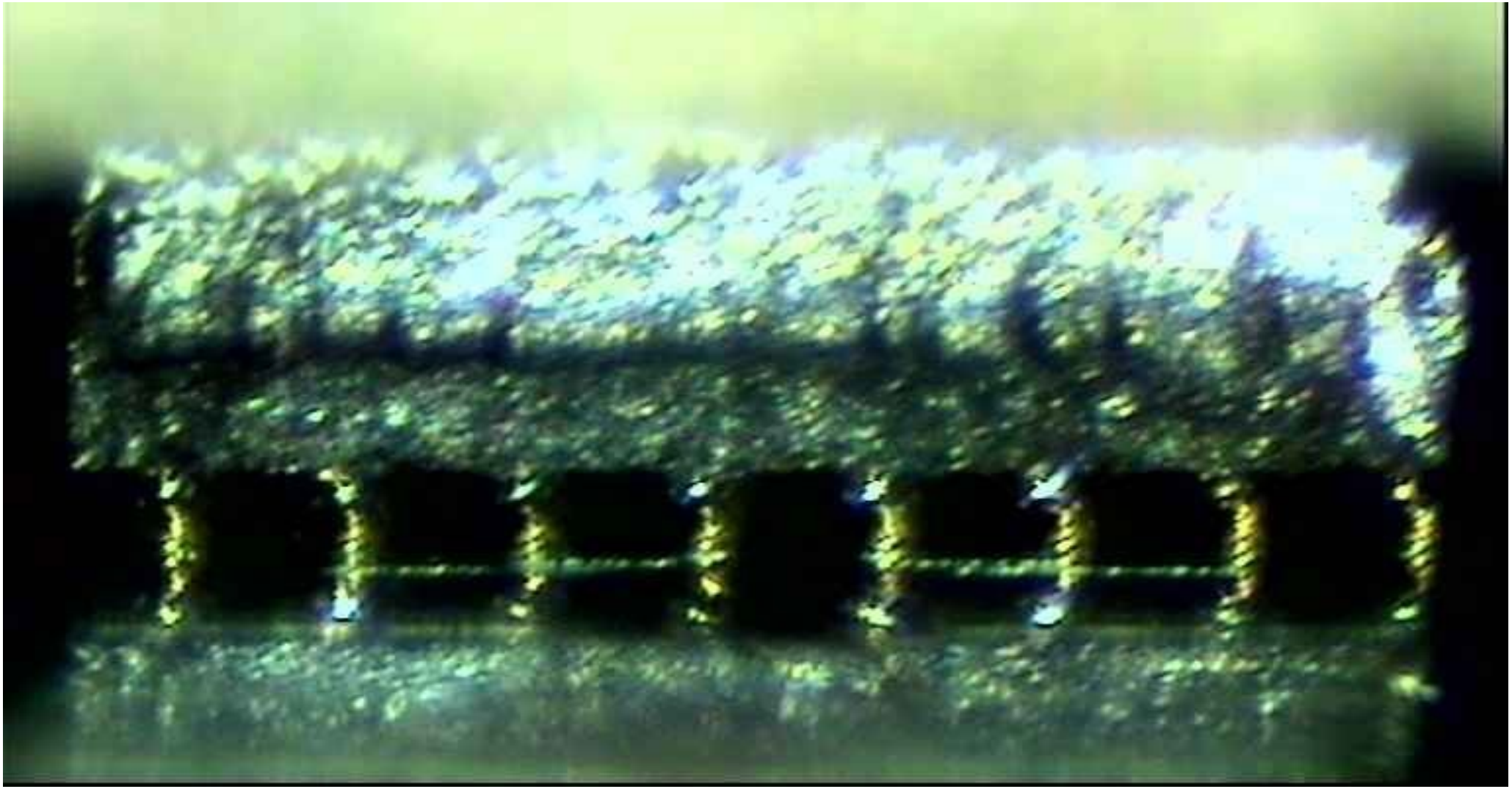


Solder Ball Side View

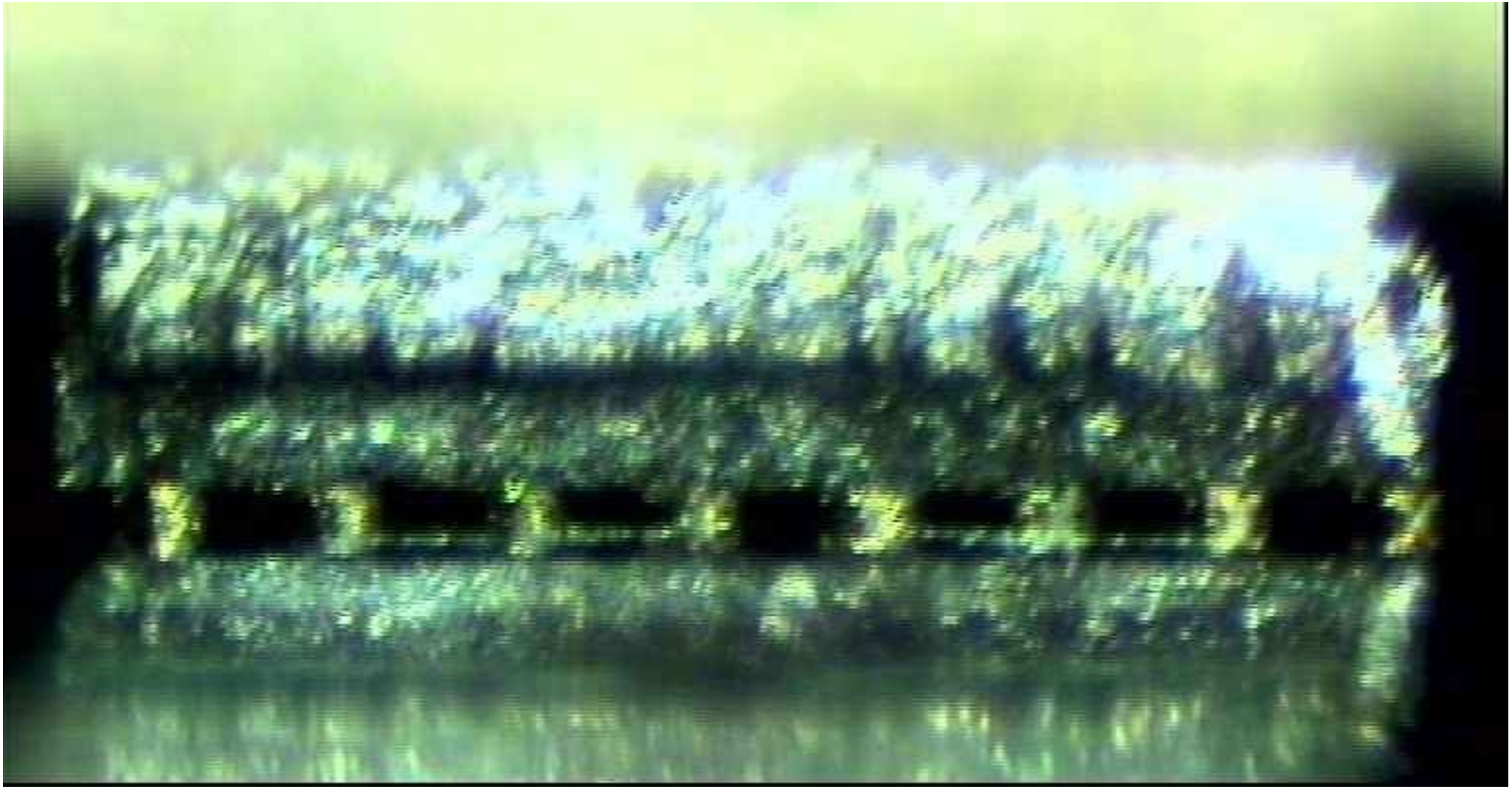




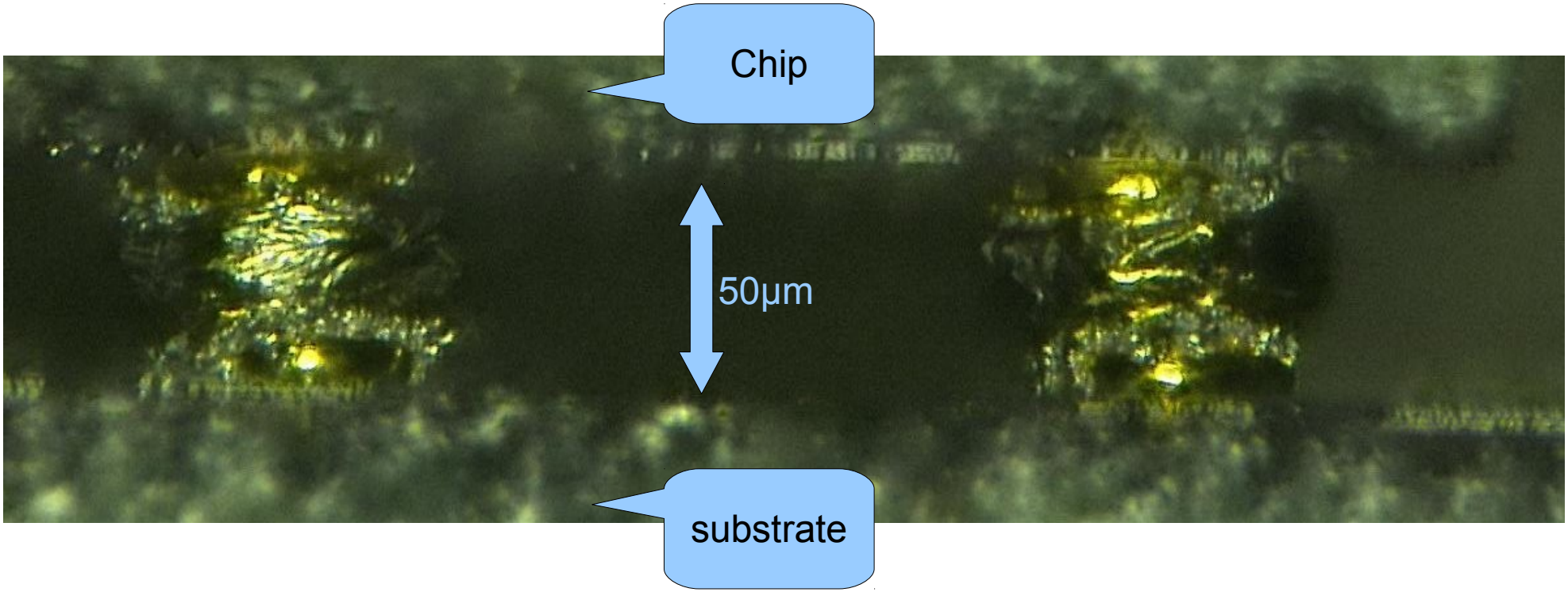
Chip Placed on Substrate



Soldered



Flipped Side View



Flipping Results

- 11 chips assembled
- gold stud – solder ball – gold stud
- 1 of 88 snakes unconnected
- no shorts
- will flip more chips

- previous goldstud flipping:
  - 20 assemblies
  - gold stud – gold stud
  - 1 of 150 snakes unconnected
  - no shorts

Thank you!