



**COMPASS**  
a FormFactor users' group conference

# Surface Metrology for Advanced Packaging Applications

FRT GmbH  
a FORMFACTOR company  
[www.frtmetrology.com](http://www.frtmetrology.com)

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# FRT – the art of metrology™

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Art – that is the interaction of craft, knowledge, experience, creativity and passion.

- Optical 3D surface metrology
- Measurement of roughness, topography, layer thickness etc.
- Defect Inspection
- Multi-sensor technology
- Modular hardware configuration
- Fast and accurate measurement
- High repeatability and reproducibility
- In-house sensor development
- In-house software development
- Contract measurements

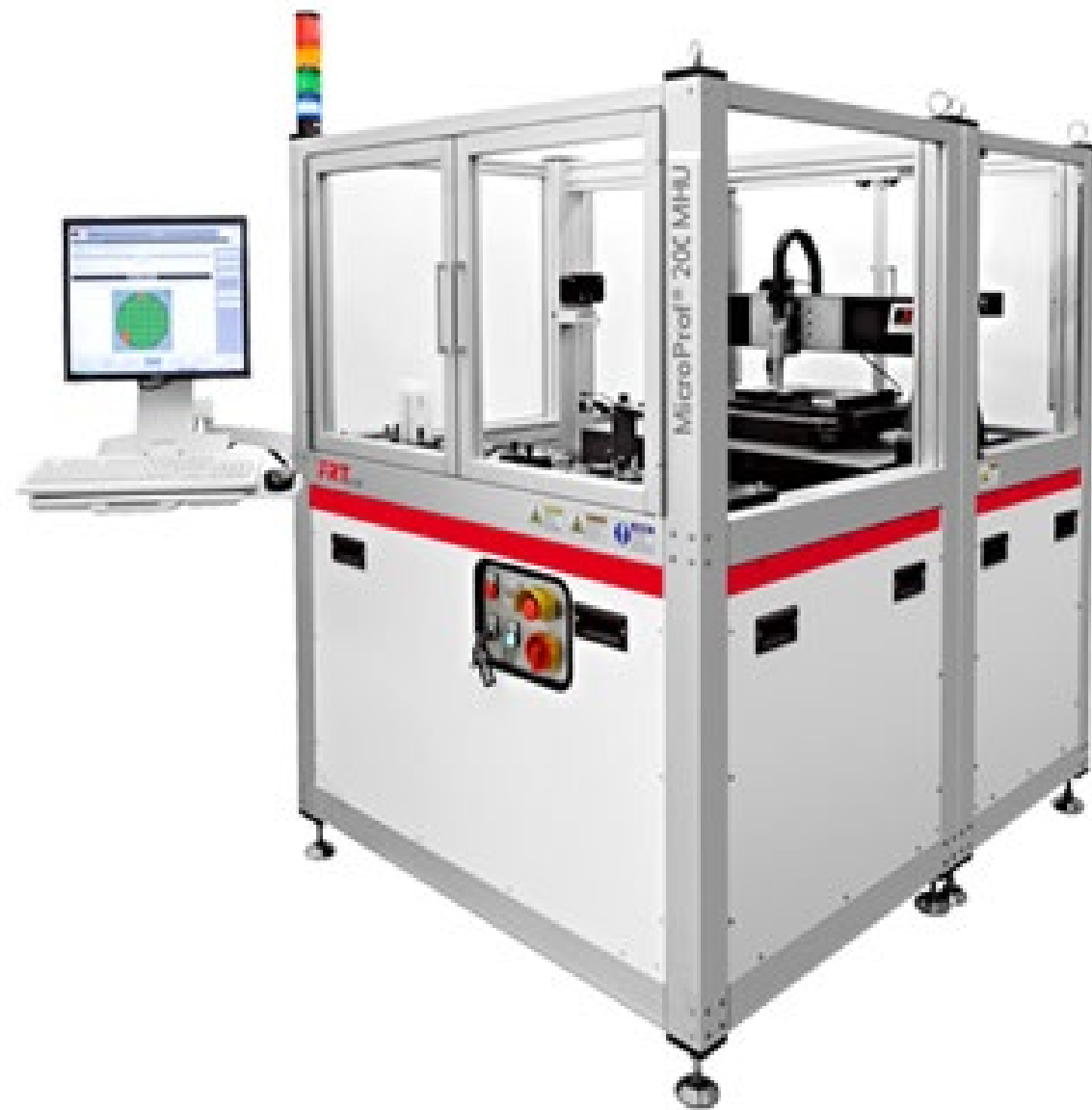


**At FRT we transform more than 20 years' experience, top-notch knowledge and complex technologies into creative solutions for our customers**

# MicroProf® Series



MicroProf® 300



MicroProf® MHU



MicroProf® FE



MicroProf® AP

# Contact free measurement

compact – multi-sensor – modular – standardized

## point sensors

- extremely flexible
- any scan range
- fast on large areas

## field of view sensors

- highest resolution
- large areas via stitching
- fast on small areas

## atomic force microscopy

- nm resolution
- large scan area
- easy handling

## film thickness sensors

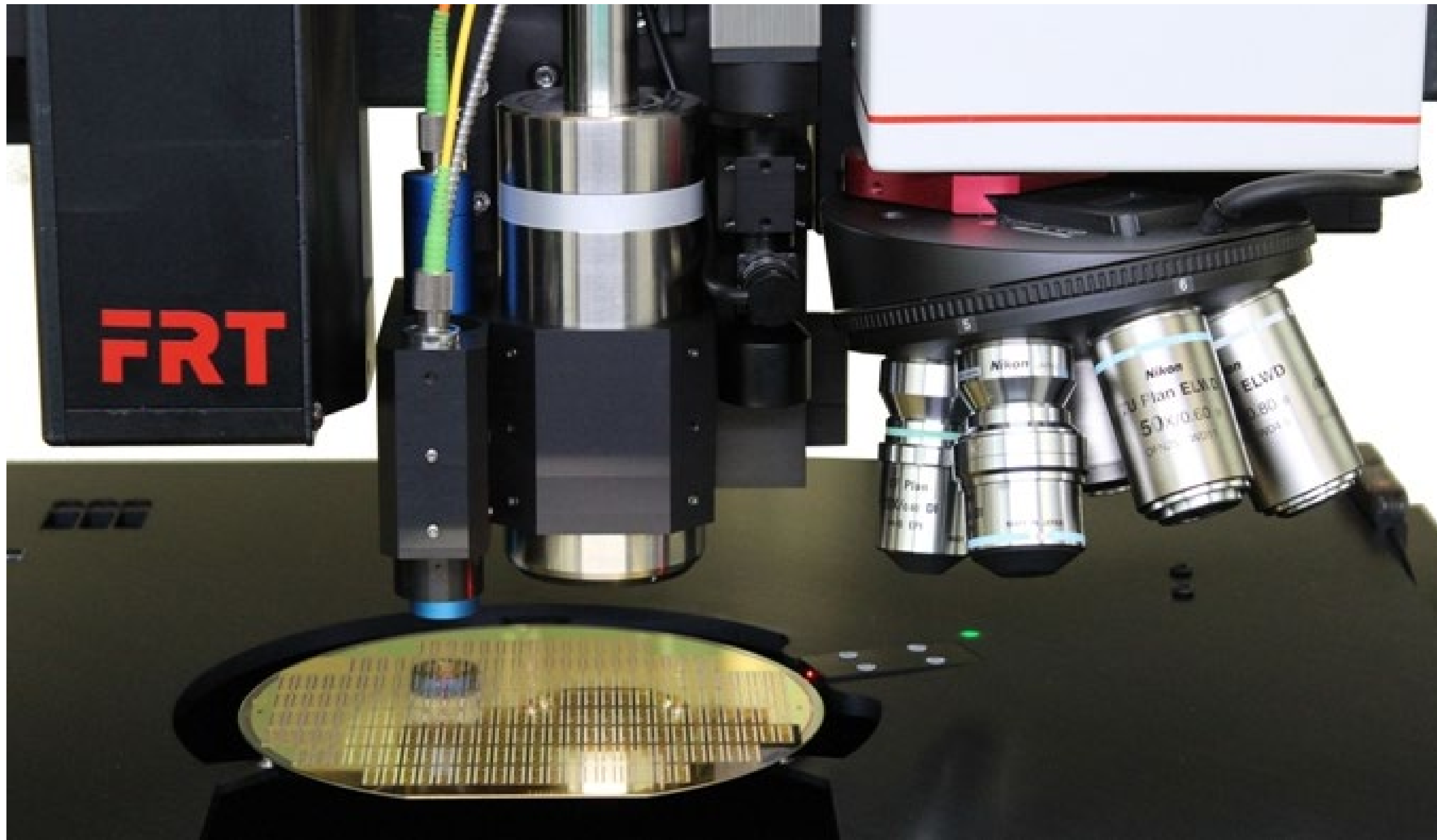
- highest resolution
- large measurement range
- measurement of multi layers





# Contact free measurement

compact – multi-sensor – modular – standardized



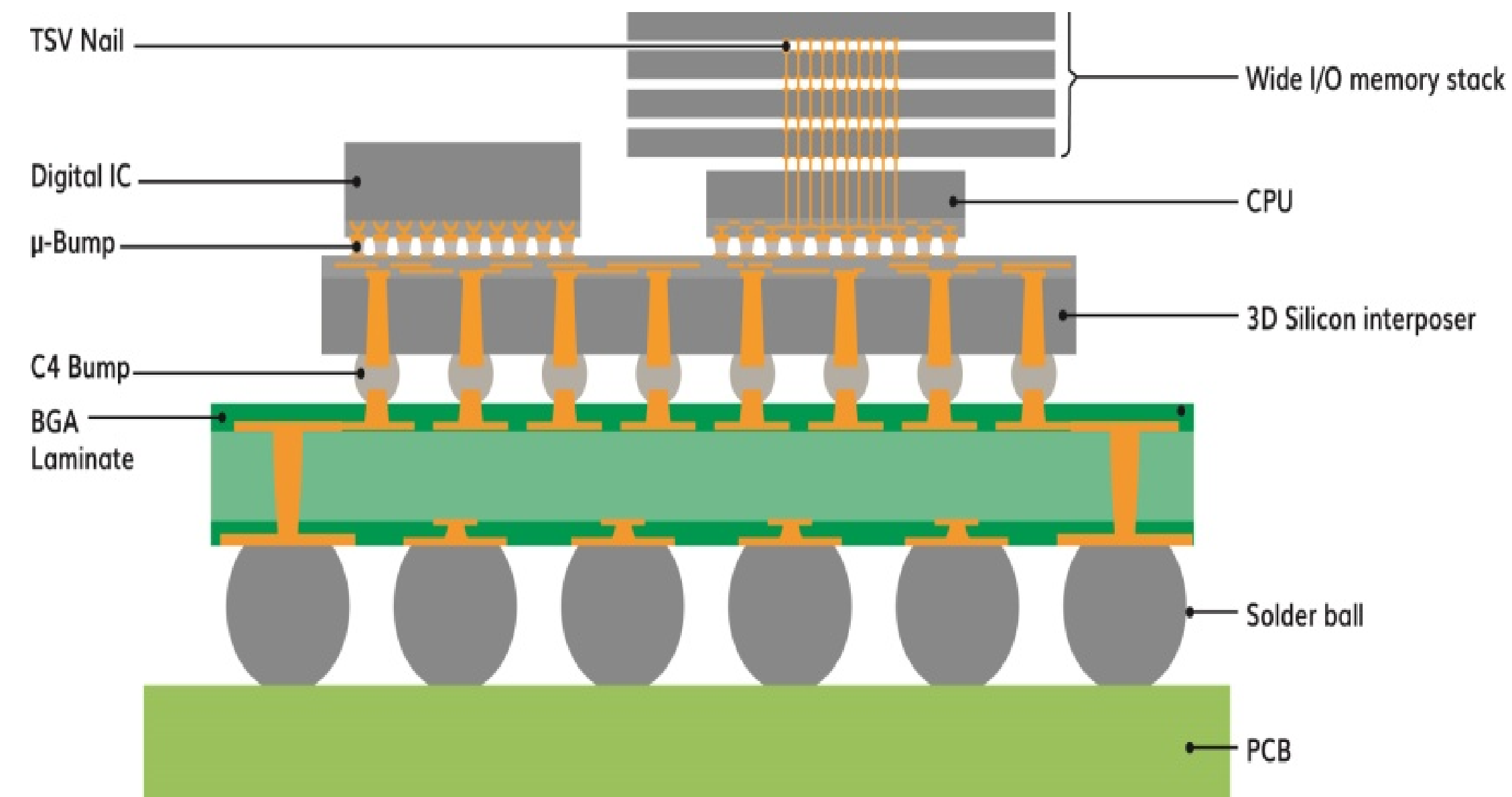
**An example of multi sensor configuration including topography point sensors, field of view and film thickness sensors**

# MicroProf<sup>®</sup> AP

## wafer metrology tool for Advanced Packaging

### Applications in Advanced Packaging

Trenches  
Metal Contacts  
TSV  
Photo Resist  
Interposer  
RDL / UBM  
Bumps /  $\mu$ -Bumps  
BGA  
Reflow soldering



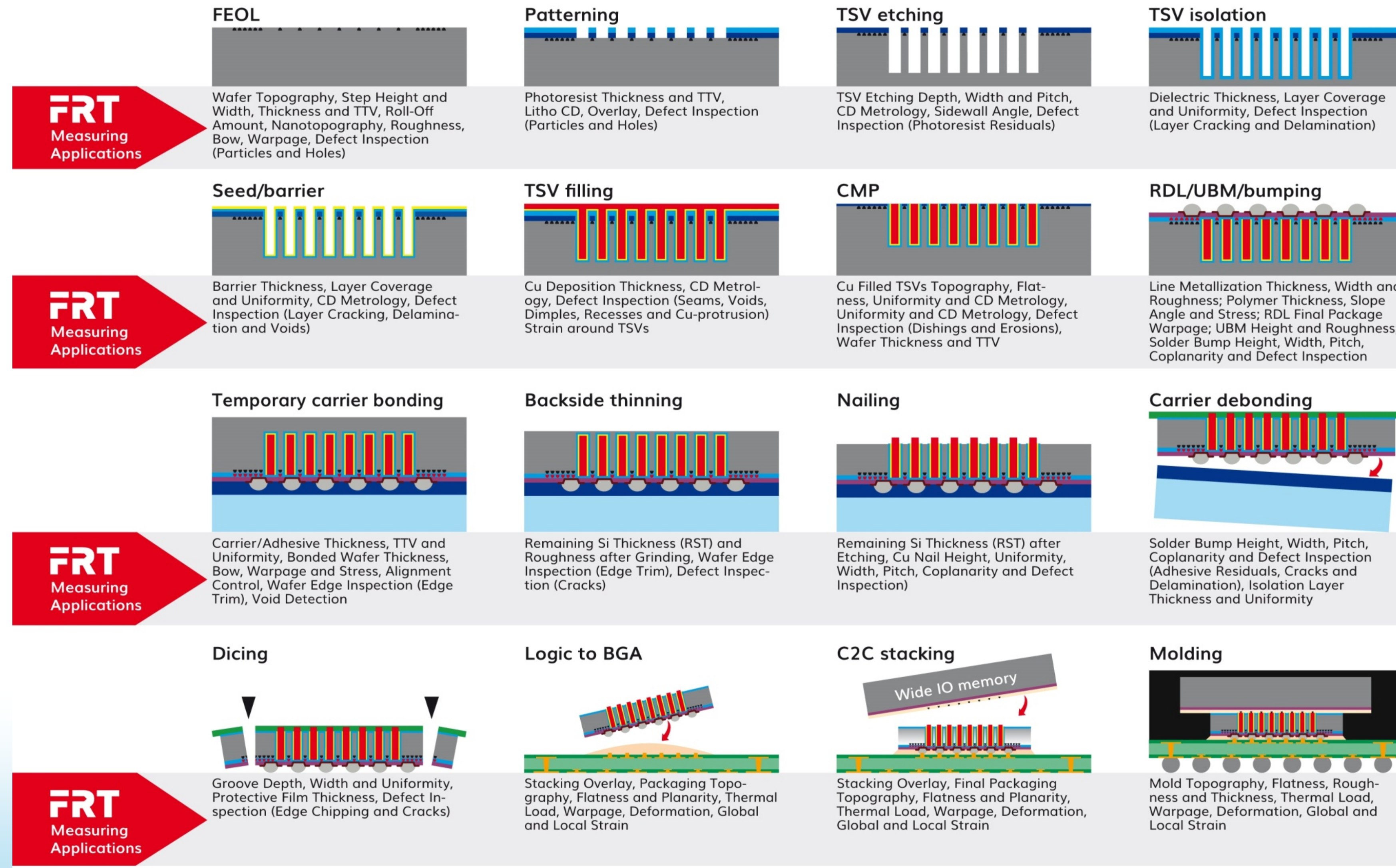
Thin film measurement  
Step height / width  
Bump analysis  
TSV / trench depth / width  
CD / Overlay  
T-dependent topography  
Stress  
Bulk thickness  
Backgrinding

**multiple measurement applications in one tool**



# 2.5D/3D IC Packaging

## process flow





## Inspection and metrology in one flexible tool

### TYPICAL APPLICATIONS

- bare wafer inspection (e.g. particles, holes, pits, micro scratches, micro roughness, growth defects, inclusions)
- layer defects (e.g. particles, holes, layer crack-ing, delamination, voids, residuals)
- filling defects (e.g. seams, voids, dimples, recesses, protrusion)>polishing defects (e.g. dishings, erosions)
- wafer edge inspection (e.g. cracks, chippings, edge trim)>stacking and molding defects (e.g. warpage, deformation, global and local strain, dimples, holes)
- wafer-level metrology for micro-bumps, RDL, overlay and through silicon via (TSV)



**fully automated inspection tool for HVM  
in Semi and MEMS**





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THANK YOU