

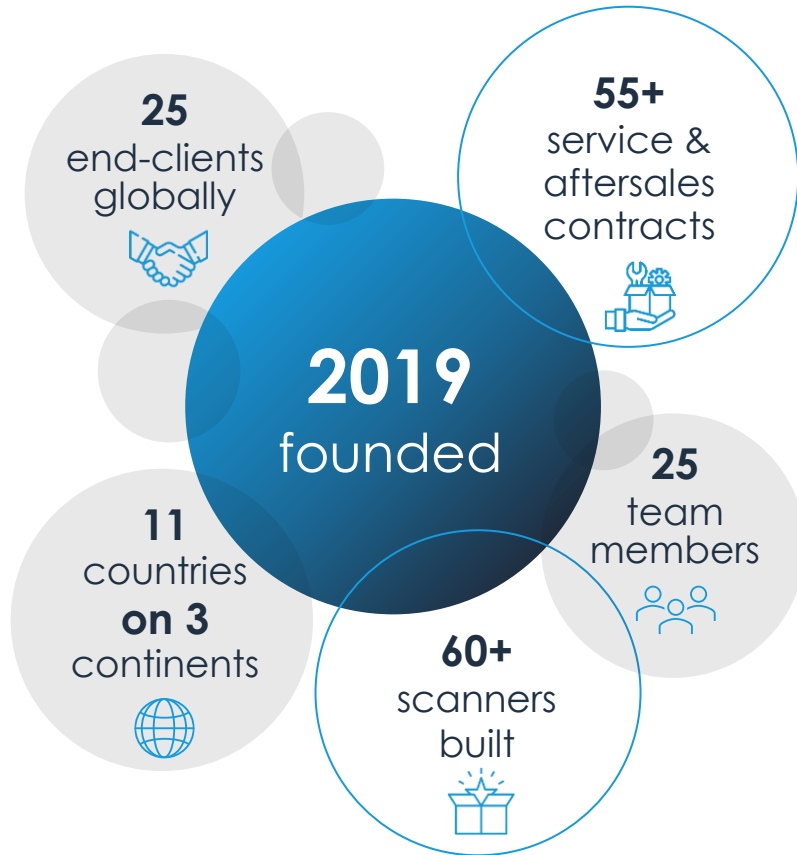


How to quantify **parts & assembly particle cleanliness**

Surface particle contamination measurement equipment

Fastmicro Introduction

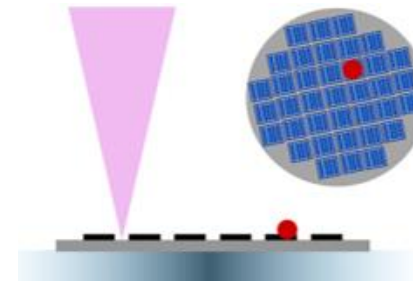
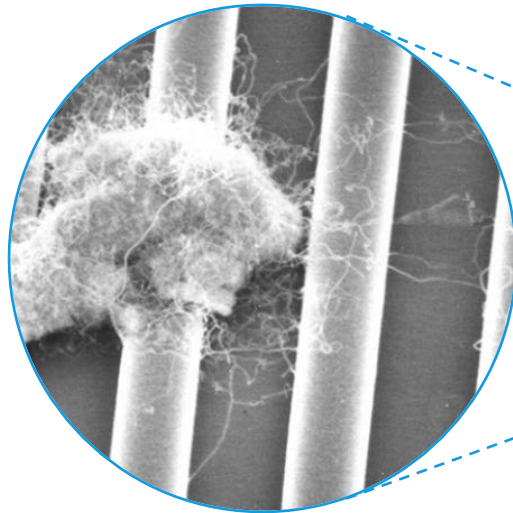
Growth track record



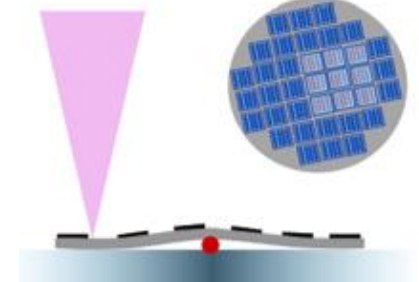
Global Challenges and trends in microtechnology

Effects of contamination on semiconductor wafers

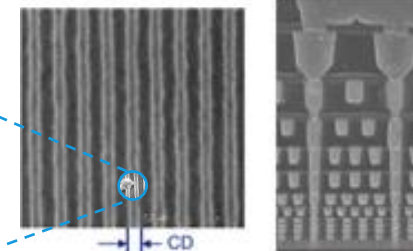
- Dimensions reducing
- Cleanliness requirements increasing
- Particle defectivity rising, causing yield challenges



Wafer front side



Wafer back side

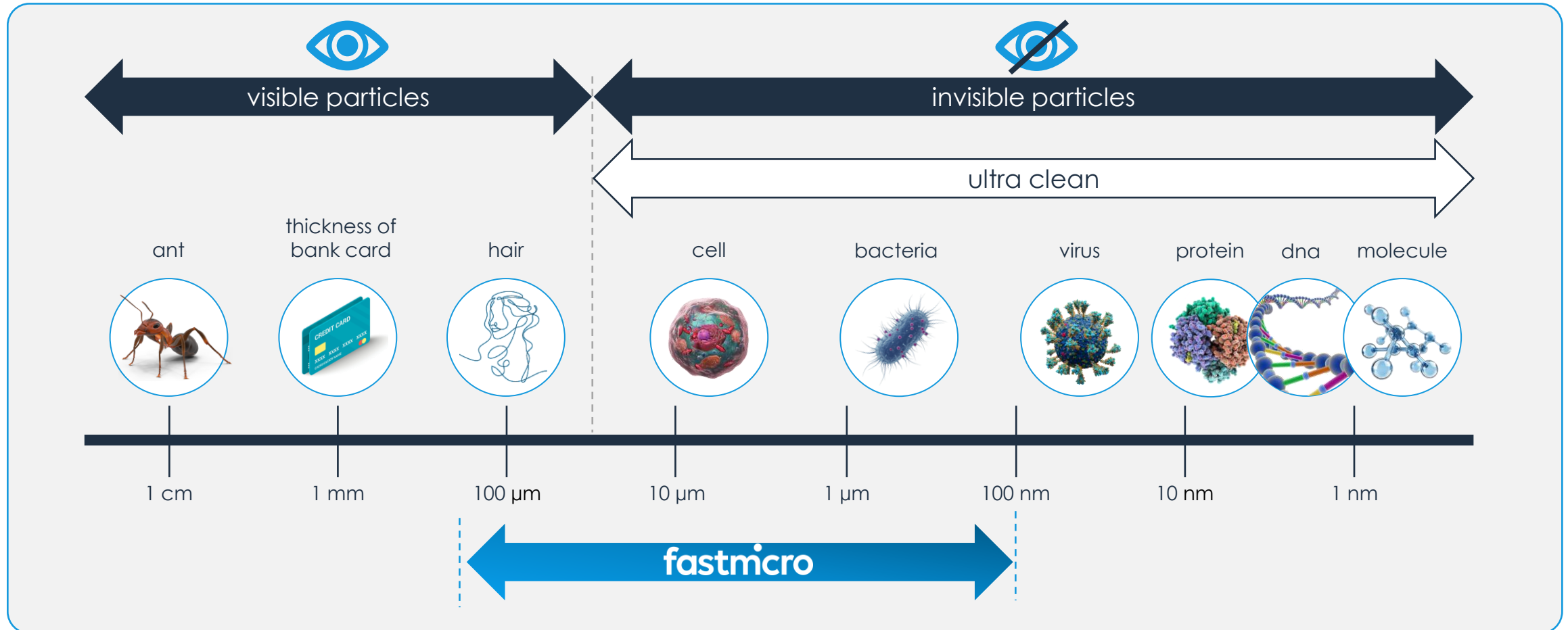


(visual representation)

Side-effects

- Non-functional die where the particle is located (front side)
- Overlay/focus errors and wafer and clamp damage (back side)

High Volume Manufacturing microtechnology industries have to control particles **invisible to the eye**





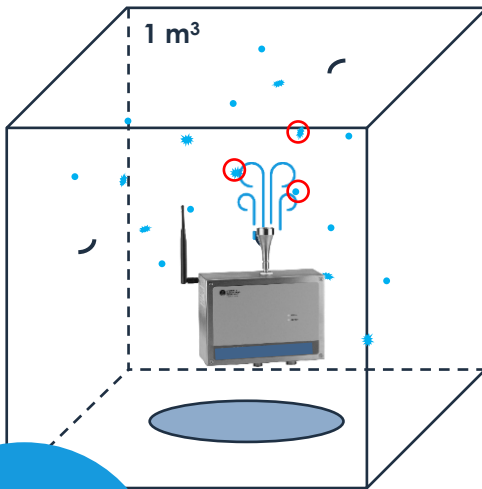
A cleanroom is not enough
for a clean product and workspace

Introducing the new standard

Deposition and surface particle contamination measurements



**Airborne Particle
Counting ('Cleanrooms')**

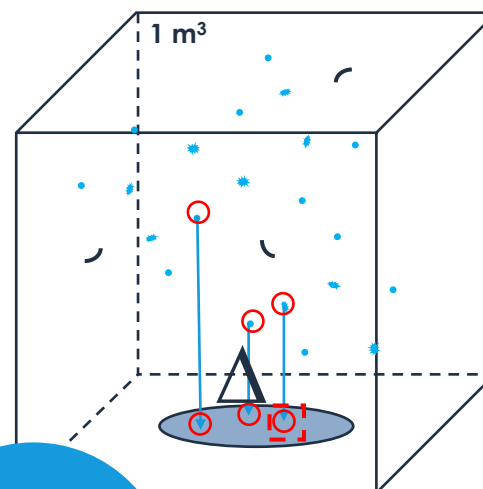


**CLEAN AIR
IN CLEANROOMS
ISO14644-1**

Counting airborne
particle concentration
Particles/m³



**Deposition rate
'Particle Fallout'**

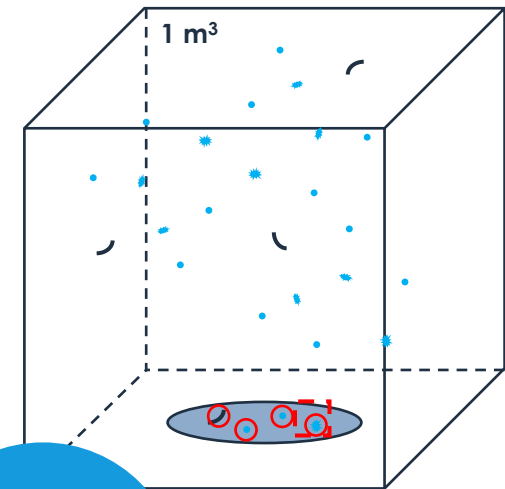


**CLEAN
PROCESS
ISO14644-17
PDRL**

Counting Particle
deposition rate
Particles/cm²/hour



**Product
surface cleanliness**



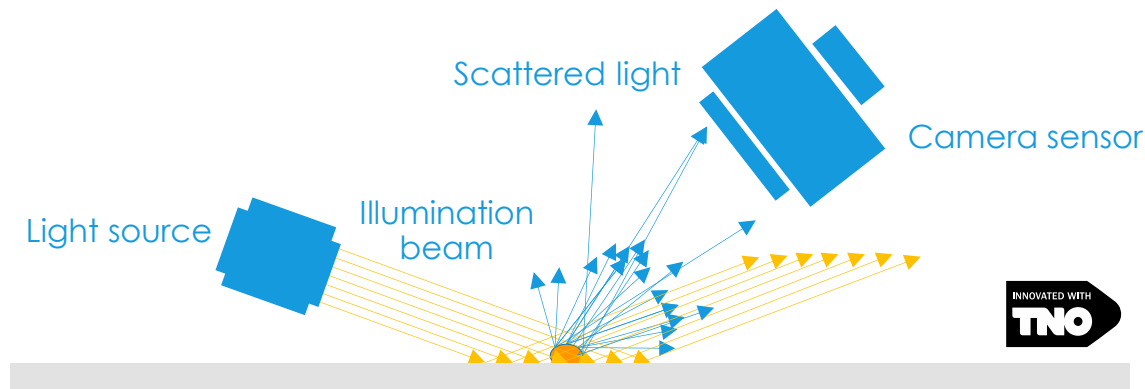
**CLEAN
PRODUCTS
ISO14644-9
SCP**

Counting surface
particle concentration
Particles/cm²

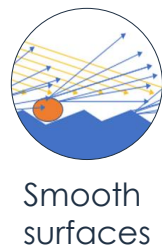
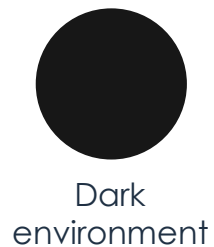
Fast particle detection at sub-micron level

Using patented light scattering technology

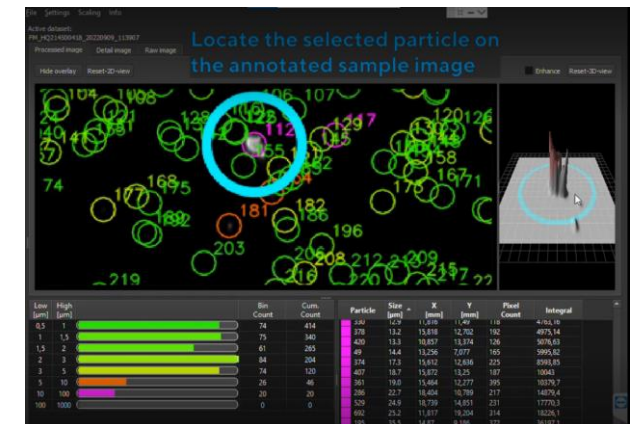
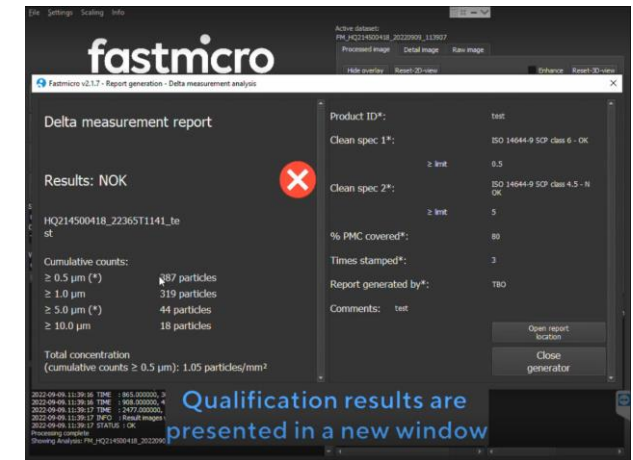
Equipment



Design principles



Software



Automatic image processing & binning

Product offering

Covering the entire semiconductor value & supply chain

Sample Scanner for clean products



Fastmicro
SP Sampler



PMC 2.0
in a box

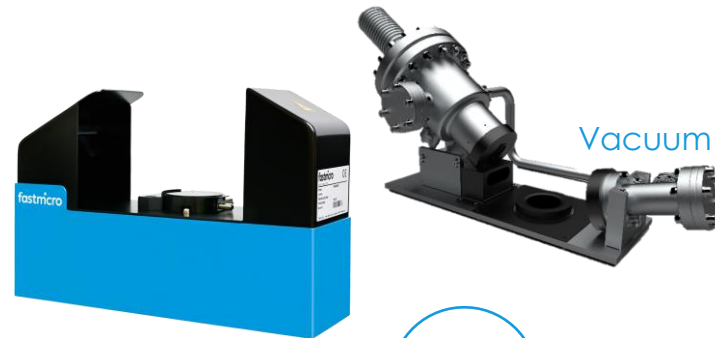


2-inch
Witness
Wafer

Applications

- Clean product qualification
- Clean assembly qualification
- Cleaning process qualification
- Cleanroom cleanliness monitoring
- Workspace cleanliness monitoring

Particle Fallout Scanner for clean processes



Ambient



2-inch
Witness
Wafer

Applications

- Continuous cleanroom cleanliness monitoring
- Continuous workspace cleanliness monitoring
- Continuous in-situ cleanliness monitoring

Particle Defect Inspection System for process control



Manual

Automated

Applications

- Wafer inspection
- Pellicle inspection
- Reticle inspection

Sample Scanner

Even for rough, curved,
difficult to reach surfaces

Key Specifications

- Measures particles from 0.5 micrometers
- Imaging in seconds, measurement results in less than one minute
- Field of View particle detection area:
 - Ø 14 mm PMC 2.0
 - Ø 20 mm Fastmicro Sampler and 2-inch wafer
- Calibration using NIST-certified PSL particles
- Samplers have more than 90% particle pickup efficiency
- Samplers leave no measurable residue
- Use with [PMC 2.0](#) and the new [Fastmicro SP Sampler](#) for indirect measurements, and with [2-inch Wafer](#) for fallout measurements

[Link to online video of sampling](#)



PMC 2.0 in a box
Interface (default)
+ recipe



Fastmicro SP Sampler
Interface + recipe



2-inch Wafer
Interface + recipe



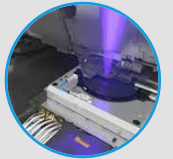
Quantitative
Measurement and
qualification reports



Easy to operate
Operator
independent



Consistent
Objective
measurements,
time after time



Equipment



Assemblies



Parts



Cleaning

Key benefits

Applications

Gen2 Particle Fallout Scanner

For continuous monitoring of particle deposition in equipment and cleanrooms

Key Specifications

- Continuous particle deposition measurement on witness wafer
- Measurement interval 10 seconds or at longer interval setting
- Particle detection from 0.5 μm
- 2-inch Field of View
- Standard KLARF and .csv export
- Compact size, (L×W×H) 300 × 100 × 200 mm
- Including Fastmicro eBox for local processing, Linux OS



2-inch Wafer
Particle trap

Why particle deposition measurement?

Process validation at the critical application surface area is the only true indicator of effective contamination control



Quantitative

Measurement and qualification reports



Easy to operate

Operator independent



Consistent

Objective measurements, time after time



Fast

Interval in 10 seconds



Cleanroom monitoring



(Manufacturing) Process monitoring

Particle Defect Inspection System

For fast in-line particle contamination monitoring in fabs

Key Specifications

- Up to 250 wafers/hour
- No moving or rotating wafer stage
- 100 / 150 / 200 mm substrate configurable (bridge tool optional)
- 4 axis dual arm robot handling with specific substrate grippers
- Simultaneous top & bottom side inspection (optional)
- Compatible with silicon, compound, glass wafers, pellicles, reticles
- High depth of focus
- No degradation of sensitive photoresist layers
- Replace multiple legacy systems with one
- Pre-scan for follow-up analysis
- Current sensitivity 200 nm
- PDS-WAC08: 2 cassette stations (1 integrated SMIF optional)



manual 4-6-8-inch wafer

PDS-WMA08



automated cassette 4-6-8-inch wafer

PDS-WAC08

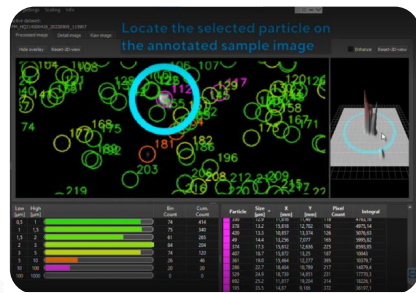
Use-case

Pre-scan **workflow** for **throughput** enhancement by combining the best of **Dark Field scatterometry** and **SEM-EDS**

fastmicro Sample Scanner



Information:
count, size and location



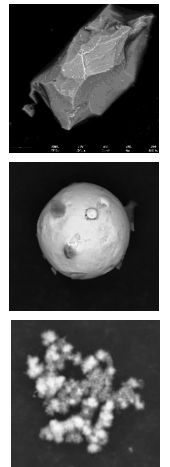
Only analyse
particles of interest
using SEM-EDS

ThermoFisher
SCIENTIFIC

Phenom XL Desktop SEM-EDS

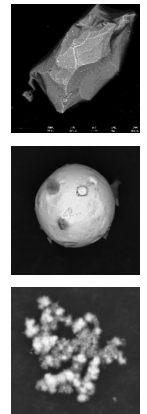
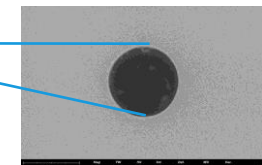
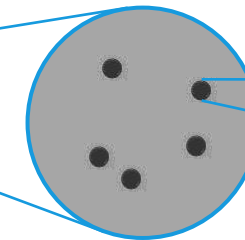
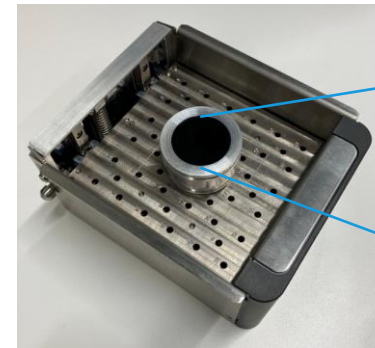
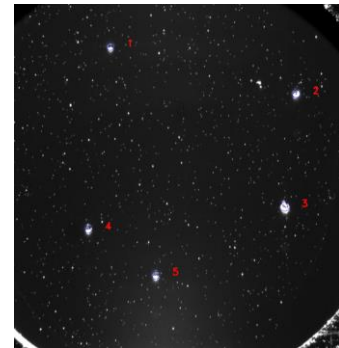
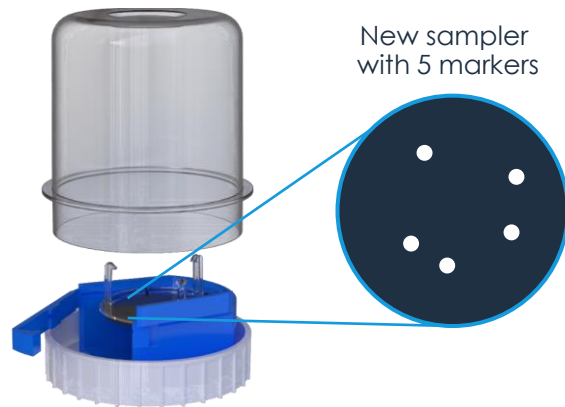
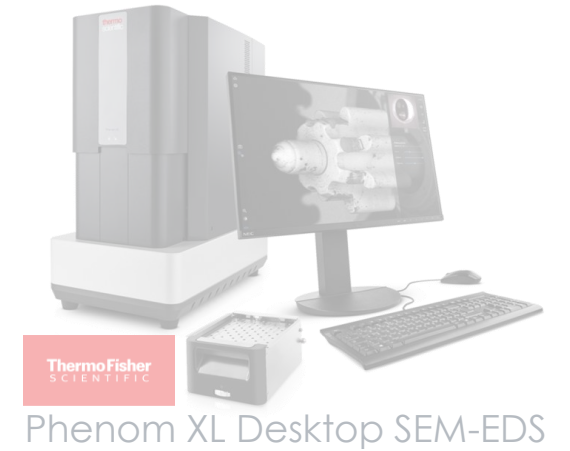


Information:
morphology, composition,
hardness & conductivity



Full particle characterization within minutes (instead of hours):
from particle localization by Fastmicro to detailed analysis by ThermoFisher

Enabling SEM workflow



thank you for your attention



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