



Fastmicro R&D topics and challenges

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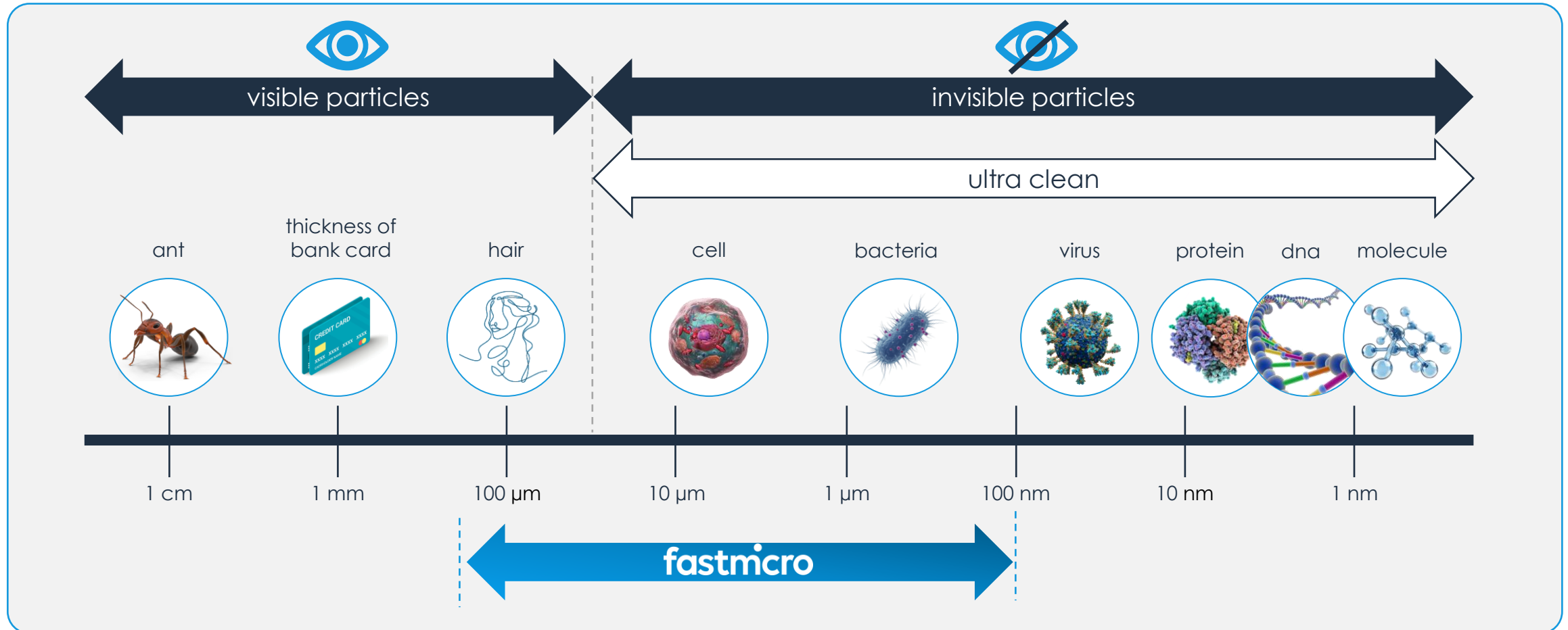
Who we are

Fastmicro



What we do

Enabling particle cleanliness control

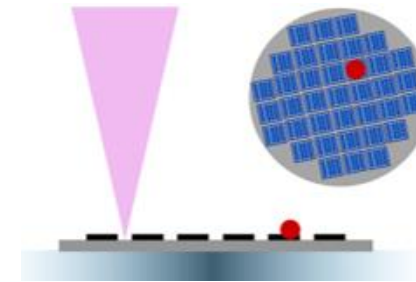
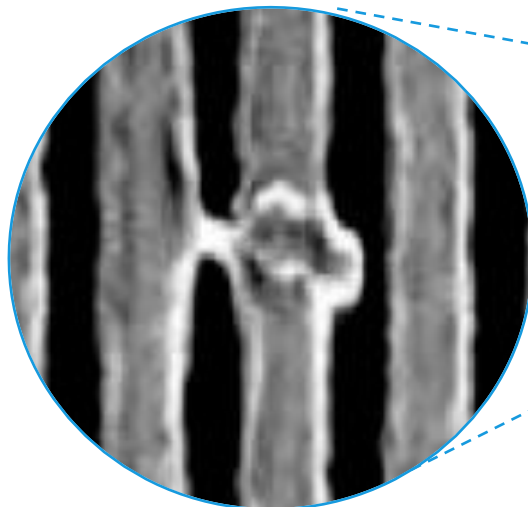


Why we do it

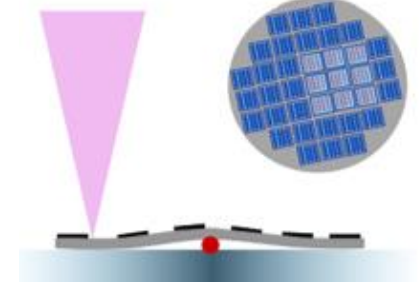
Global Challenges and trends in microtechnology

Effects of **contamination** on semiconductor **wafers**

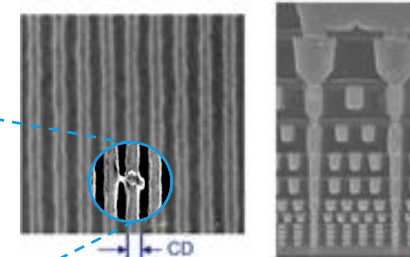
- Geometries are shrinking
- Yield losses from particle contamination are rising.
- AI, EUV litho, Advanced Packaging, Hybrid Bonding, and Compound Semiconductors all increase sensitivity to particles.
- Existing inspection methods are too slow, inconsistent, or not quantitative enough.



Wafer front side



Wafer back side



(visual representation)

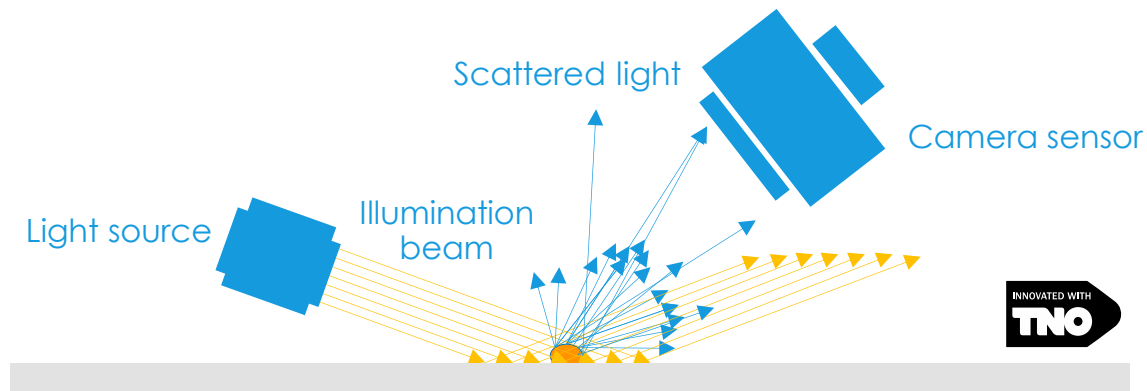
Side-effects

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

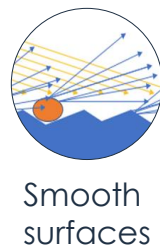
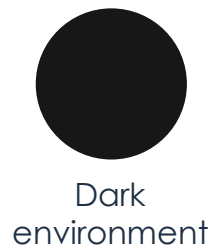
How we do it

Patented darkfield technology

Equipment

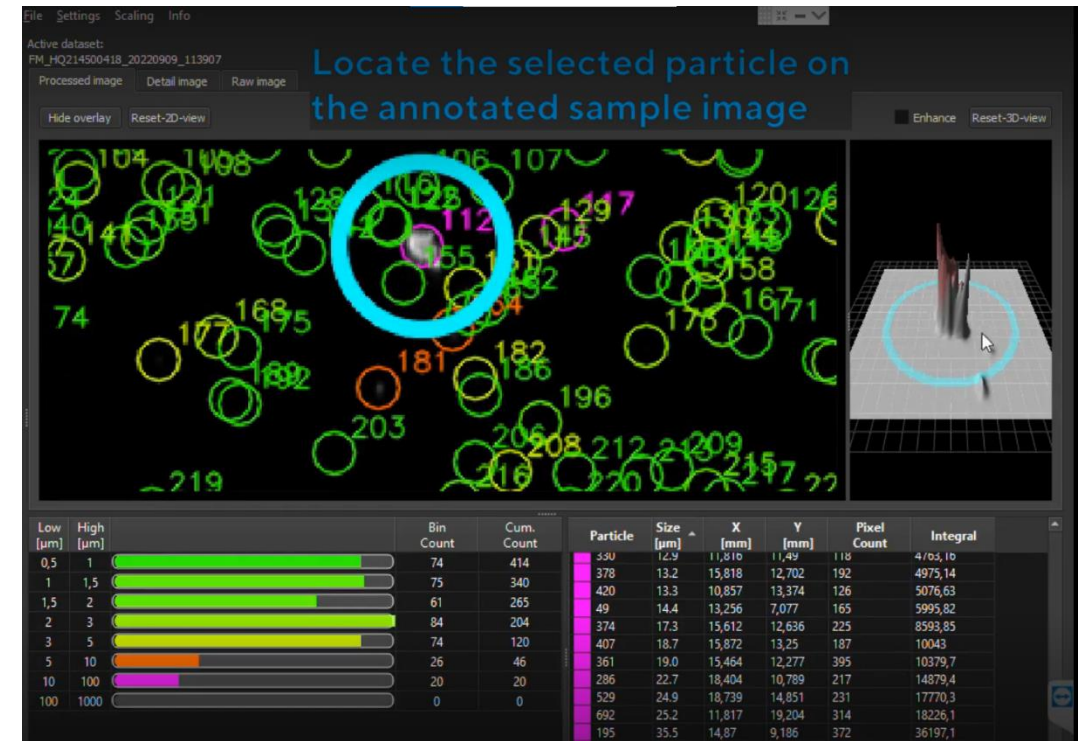


Design principles



Software

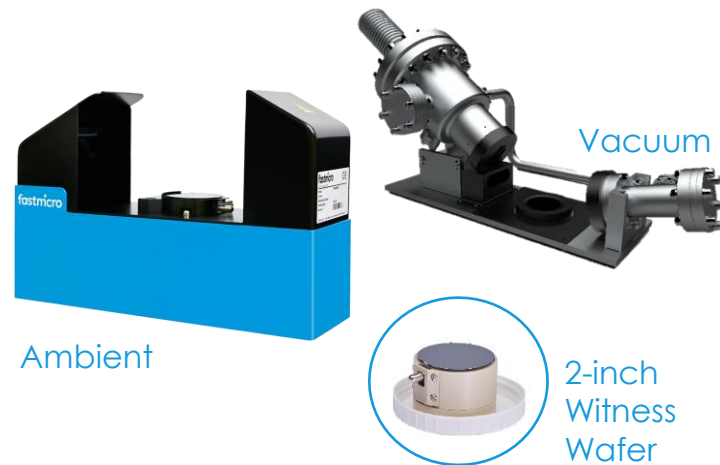
Automatic image processing & binning



What we bring to the market

Particle counting systems for multiple applications

Particle Fallout Scanner for clean processes



Applications

- Continuous Cleanroom cleanliness monitoring
- Continuous Workspace cleanliness monitoring
- Continuous In-Situ cleanliness monitoring

Sample Scanner for clean products



Applications

- Clean surface/product/assembly qualification
- Cleaning process qualification
- Troubleshooting & Failure Analysis
- Cleanroom cleanliness monitoring
- Workspace cleanliness monitoring

Particle Defect Inspection System for wafer inspection



Applications

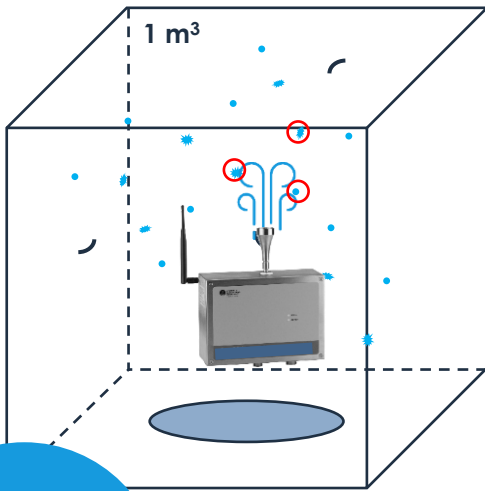
- Bare wafer inspection
- Blanket films wafers inspection

Which standards we support

Deposition and surface particle contamination measurements



Airborne Particle Counting ('Cleanrooms')

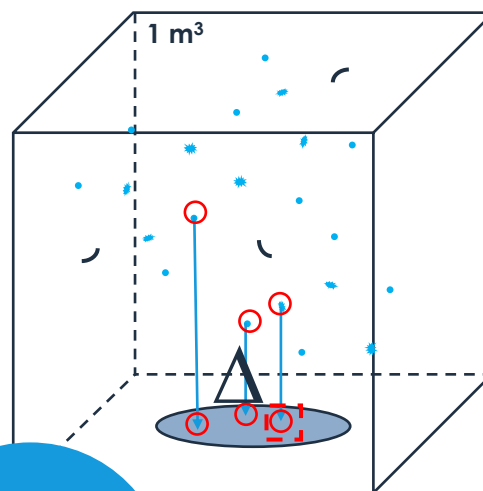


**CLEAN AIR
IN CLEANROOMS
ISO14644-1**

Counting airborne
particle concentration
Particles/m³



**Deposition rate
'Particle Fallout'**

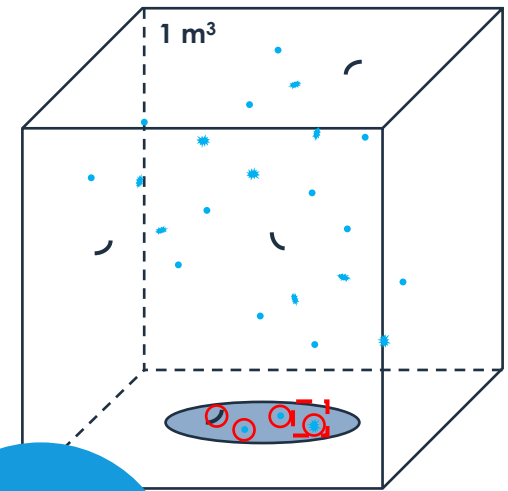


**CLEAN
PROCESS
ISO14644-17
PDRL**

Counting Particle
deposition rate
Particles/cm²/hour



**Product
surface cleanliness**



**CLEAN
PRODUCTS
ISO14644-9
SCP**

Counting surface
particle concentration
Particles/cm²

Where we want to go

Technical roadmap

Current capabilities

Quantification:

- >500 nm particle measurement in seconds
- >200 nm particle measurement in minutes

Qualification:

- Location
- Particle size indication
- Timestamp

Facilitation:

- Fastmicro – SEM EDS workflow

Target capabilities

Quantification:

- >200 nm particle measurement in seconds
- >100 nm particle measurement in minutes

Qualification:

- Particle classification capabilities
 - Metallic vs nonmetallic
 - Organic vs nonorganic
- Feature recognition
 - Scratch/dent/pits/...

Facilitation:

- Combining Fastmicro products with other technologies

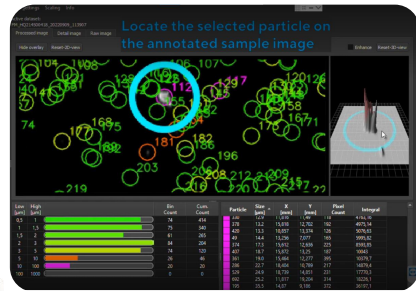
Where this can lead to

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



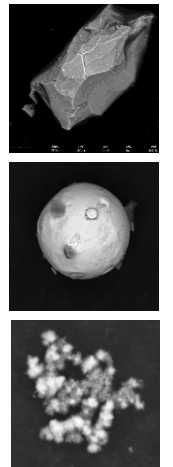
Only analyse
particles of interest
using SEM-EDS

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

Whom we will collaborate with?

You?

- Collaborate to improve technology/products
- Collaborate to combine/adopt technologies
- Collaborate to facilitate workflows
- Explore applications in various fields
- Explore applications on various samples
- ...

thank you for your attention



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