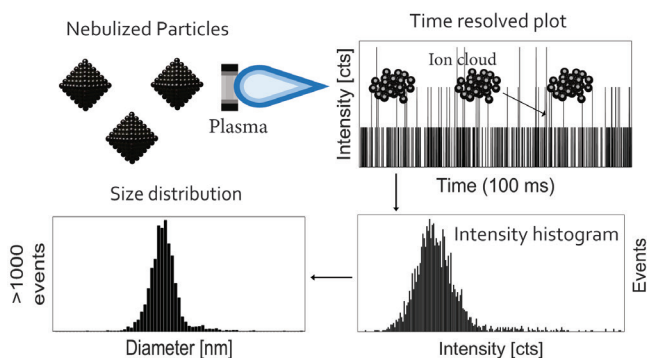


# Principles of Single-Particle ICP-MS

## SCIDENTIFY ICP-MS technology brief

### SP-ICP-MS principles of operation

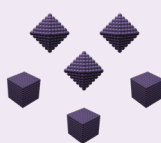
ICP-MS is routinely used to determine the concentration of elements, which involves sample digestion. In single-particle ICP-MS, undigested dispersions are nebulized and introduced to the plasma torch one particle at the time. Individual particles are ionized and arrive at the mass analyzer as ion clouds. Each ion cloud or particle event is recorded and contains all the information of the original particle: the size, composition and even the shape.



### Number concentrations

The frequency of the particle events (ion clouds) detected is directly proportional to the number concentration of the dispersion. This allows to measure particle concentration as low as 10,000 particles/mL

### TEM takes HOURS ICP-MS takes MINUTES

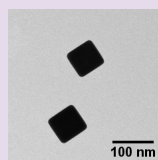


Count 100 particles/hour

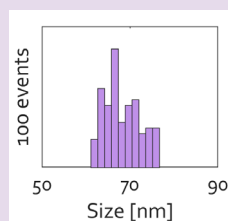
Count 1000 particles/min

### Size distributions

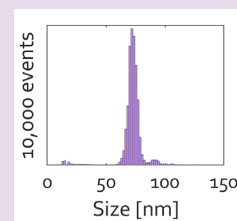
The size of the particles is measured with atomic resolution. A size distribution >10,000 events can be generated within minutes. 100X faster than conventional EM approaches.



Only frequent events

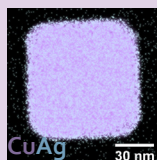


Frequent+rare events

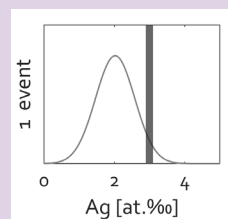


### Composition distributions

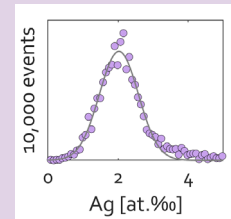
For particles that contain multiple elements, composition distributions can be generated with the composition of each individual particle accounted for. No other solution can.



Only one composition



Complete range



### References

1. ACS Nano, 2022, 16, 11968-11978

# High-Throughput Sizing, Counting, and Elemental Analysis of Anisotropic Multimetallic Nanoparticles with Single-Particle Inductively Coupled Plasma Mass Spectrometry

Cedric David Koolen, Laura Torrent, Ayush Agarwal, Olga Meili-Borovinskaya, Natalia Gasilova, Mo Li, Wen Luo,\* and Andreas Züttel



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