femtoG.com
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Spin-off | ETH zürich

femtoG
Unveiling structure

Our next-generation analyzers **measure what current solutions only assume**. femtoG helps producers and users of powdered materials to **get more accurate and reliable results**.

… save resources in development of new materials[1]

… shorten production ramp-up times by 70%[2]

… 75% cost saving and reliability to meet regulatory requirements[3]

[1] femtoG measures three fundamental particle properties with no assumptions and with half as long sample preparation times
[2] When comparing PowMaster dry dispersion against a centrifugal particle sedimentation as method for product validation.
[3] When comparing PowMaster dry dispersion nanoparticle quantification against manual electron microscopy counting

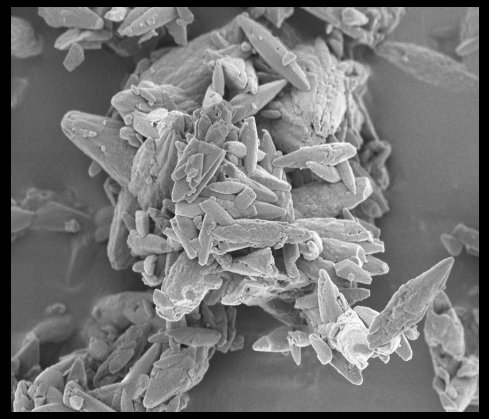
Welcome at femtoG

The Hidden Flaw in Particle Analysis

The proper performance of any powdered material is strongly dependent on its size.

What current analyzers assume:

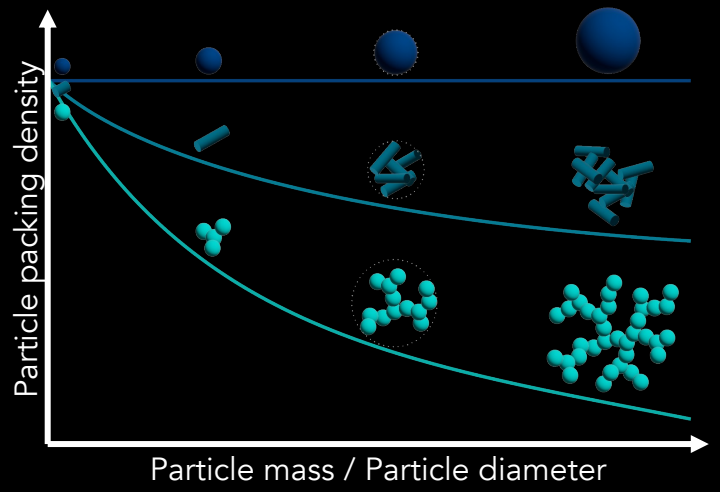
What actual particles look like:



"If you can't measure it correctly, you can't control it."

- ⚠ Slow and costly R&D cycles
- ⚠ Insufficient quality control
- ⚠ Slow production ramp-up
- ⚠ Hard to define safety standards

Introducing femtoG



Dr. Jörg Wieder *Dr. Franz Friebel*

Founders of femtoG

Mission: Unveiling structure

We revolutionize powder analysis. Our analyzers measure particle properties that traditional methods can't. Using aerosol-based single-particle measurements, we give a complete view of material structure and quality.

Core Offer: PowMaster

Our analyzers measure each particle's mass and size, delivering full size distributions and structural insights in minutes. We offer:

- Sale of analyzers and software
- R&D projects / special analyses
- Consulting and Education

Who We Are:

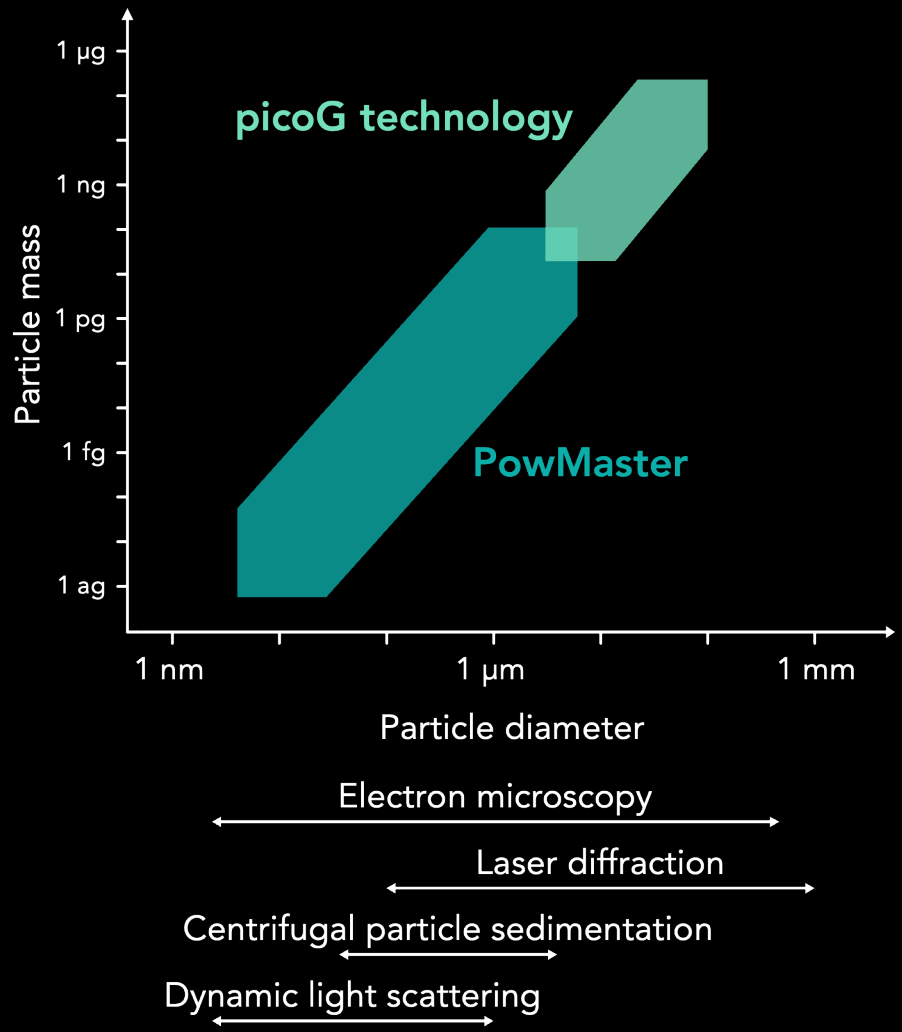
femtoG is a spin-off from ETH Zurich with deep roots in aerosol science. Our team of PhD scientists specializes in innovative nanoparticle and microparticle measurement technologies.

Status-Quo in Particle Characterization

femtoG = More information, in less time, from any particles source

Method[1]	Measurands	Needed material information	Dispersion modes	Analysis time	Instrument cost
picoG technology	Mass + diameter + packing density (aerodynamic diameter)	-	Dry, wet, or online	Minutes	$
PowMaster	Mass + diameter + packing density (electronic mobility diameter)	-	Dry, wet, or online	Minutes	$$
Electron microscopy	Diameter + morphology (projected or Feret diameter)	-	Dry	Hours	$$$
Laser diffraction	Diameter (Equivalent spherical diameter by scattering)	Refractive index	Dry or wet	Minutes	$$
Centrifugal particle sedimentation	Diameter (Stokes diameter)	Packing density	Wet	Hours	$
Dynamic light scattering	Diameter (Hydrodynamic diameter)	Refractive index	Wet	Minutes	$

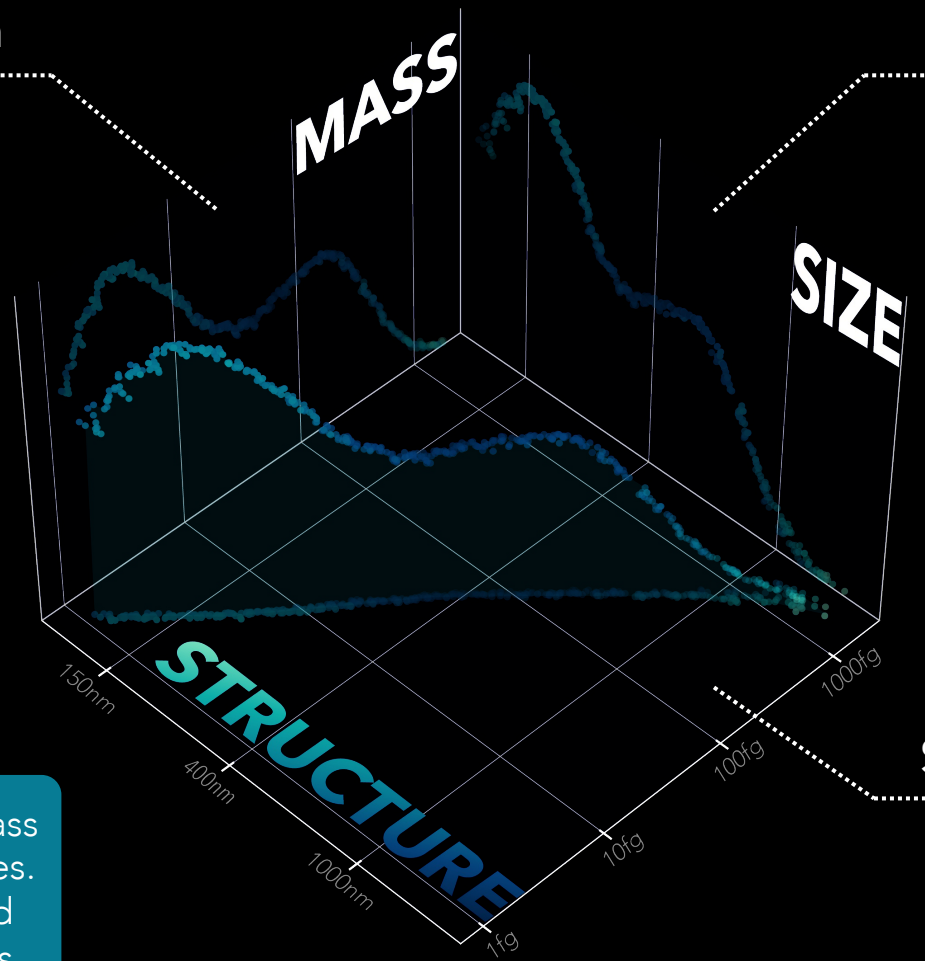
[1] Please reach out if your current method is missing, we are happy to explain the differences.



femtoG 3-in-1 Approach

Single particle mass distribution

- *Fundamental parameter*
- *Material-independent*
- *Mass-based metric (e.g., number of particles per gram of material, number of primary particles per aggregate)*
- *Deagglomeration assessment*



Single particle size distribution

- *Electronic mobility diameter*
- *Capturing 3D geometry*
- *Unbiased, without assumptions*
- *Used for density calculation*

Single particle packing densities

- *Discrimination of materials*
- *Aerodynamic behavior*
- *Porosity and fractality*

femtoG analyzers measure the size, mass and concentration of individual particles. This allows for structural evaluation and quantitative comparison of populations.

Benefits Over Existing Methods

Detection of individual particles

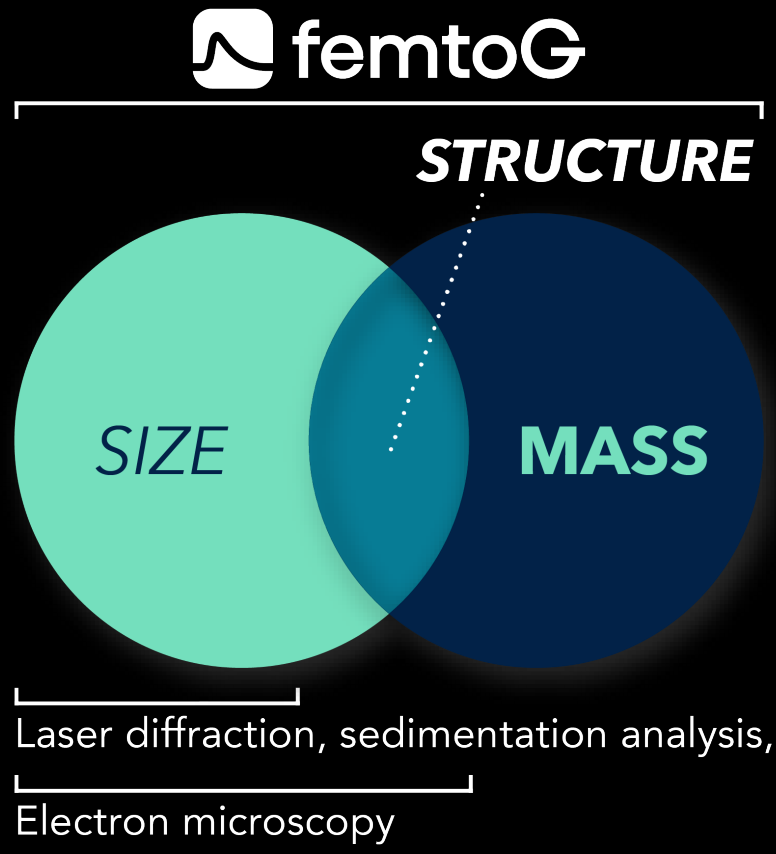
Fast & real-time measurements

Multiparameter quantification

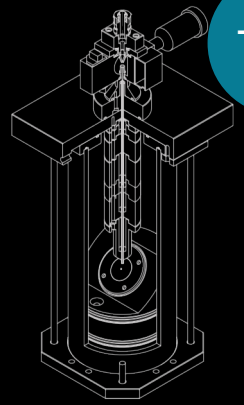
No assumptions needed

Strong counting statistics

Multi-component systems with ease



Our Next-Generation Analyzers

Instrument	Measurement principle	Size and mass range	Measurement mode	Application fields
PowMaster TRL 9  *Dispersion setup and control not shown*	Centrifugation (mass), electric mobility (diameter)	Nano- and micromaterials 5 nm – 5 µm	Real-time or Scan mode (5-15 min)	Advanced R&D, QA/QC, production monitoring, regulatory reference nanomaterials
picoG technology TRL 4  The patented *picoG technology* is being developed to detect micromaterials as standalone device and as PowMaster extension	Acoustic impaction (mass), time-of-flight (diameter), optical (shape)	Micromaterials 5 µm – 100 µm	Real-time or scan mode (1-5 min)	Advanced R&D, QA/QC, workplace & production monitoring

Clients We Serve

By Application:

- Agglomerate stability
- Health and Safety
- Material development
- Nanoparticle quantification
- Quality control
- Particle integrity
- Product clearance
- Process monitoring
- Process optimization

By material:

- Battery materials
- Calcium carbonate
- Carbon Black
- Carbon nanotubes
- Color pigments
- Fibrous materials
- Recovered Carbon Black
- Silica
- Titanium dioxide

... and many more

By Industry:

- Aerospace
- Automotive
- Chemical
- Construction
- Energy
- Food
- Manufacturing
- Mining
- Pharmaceutical
- Recycling

"The simultaneous measurement of particle size and effective agglomerate density opens a promising new viewpoint for product characterization."
Thomas Koch, Head of R&D at KRONOS

"femtoG has greatly helped us to understand the physical impacts of our refinement process on the sizes and densities of the aggregates. The discussions with the team were invaluable and are recommended."
Dr. Vitaly Khusidman, Founder and CEO of G3C Technologies Corporation

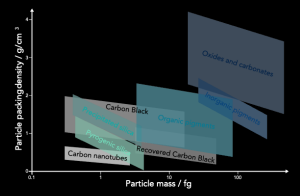
femtoG Applications

Click to jump to slide

For R&D, QC/QA

Applications for R&D, QC/QA

- Get fundamental trends, e.g. in product lines, right without assumptions and translate to other methods
  - ➢ True size of aggregated particles
- Probe dispersibility by applying different sample preparations
  - ➢ Aggregates or agglomerates?
- Obtain a quick structural comparison among different products or batches to
  - ➢ Size and structure of color pigments



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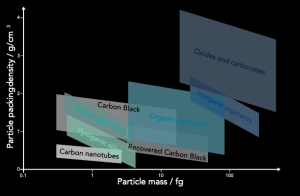
For Production, Monitoring

Applications for Production

- Reduce time to clear production with fast analysis in your laboratory
- Live monitoring of structure directly in production line
- Fast detection of oversized particles



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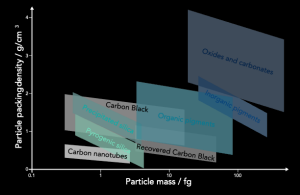
For Regulatory Affairs

Applications for Regulatory Affairs

- Quantify absolute nanoparticle content
  - ➢ Nanoparticles per gram
- Test the stability of surface treatments and potential nanoparticle release
  - ➢ Coating stability and nanoparticle release
- Determine particle mass and volume for inhalatory studies



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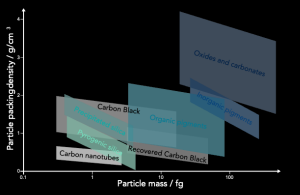
For Special Applications

Special Applications

- Master analytical obstacles with ease, e.g. characterization of magnetic particles
  - ➢ Characterizing magnetic particles
- Expand your PowMaster system with additional sample treatment, e.g. heat to probe thermal stability and particle composition
  - ➢ Singe-particle TGA



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Explore all our application notes, presentations, and papers at: www.femtoG.com/ANs.html

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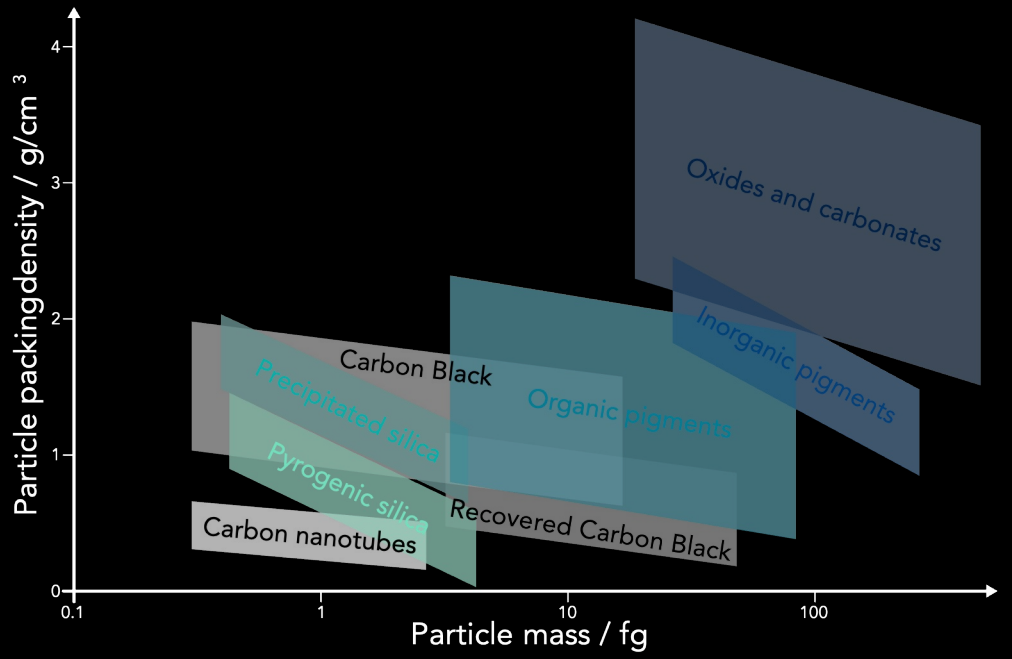

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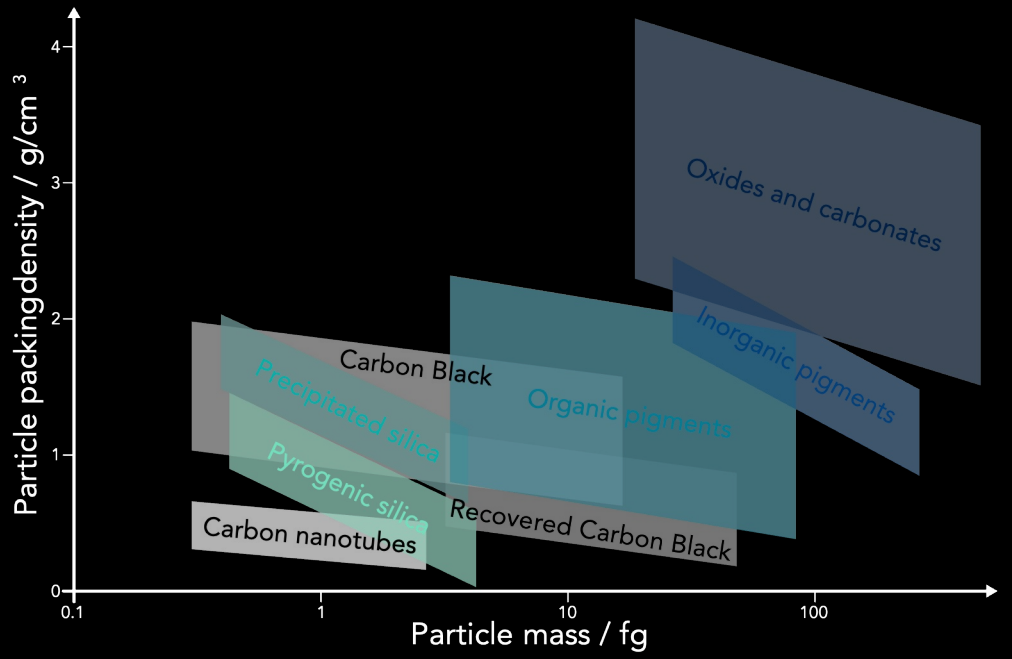

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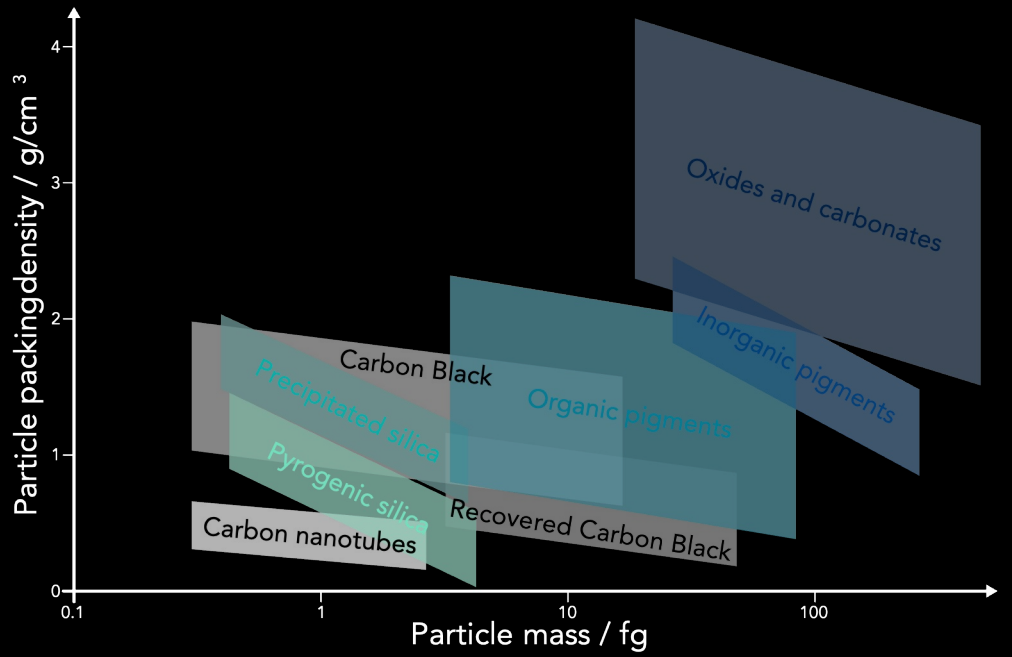

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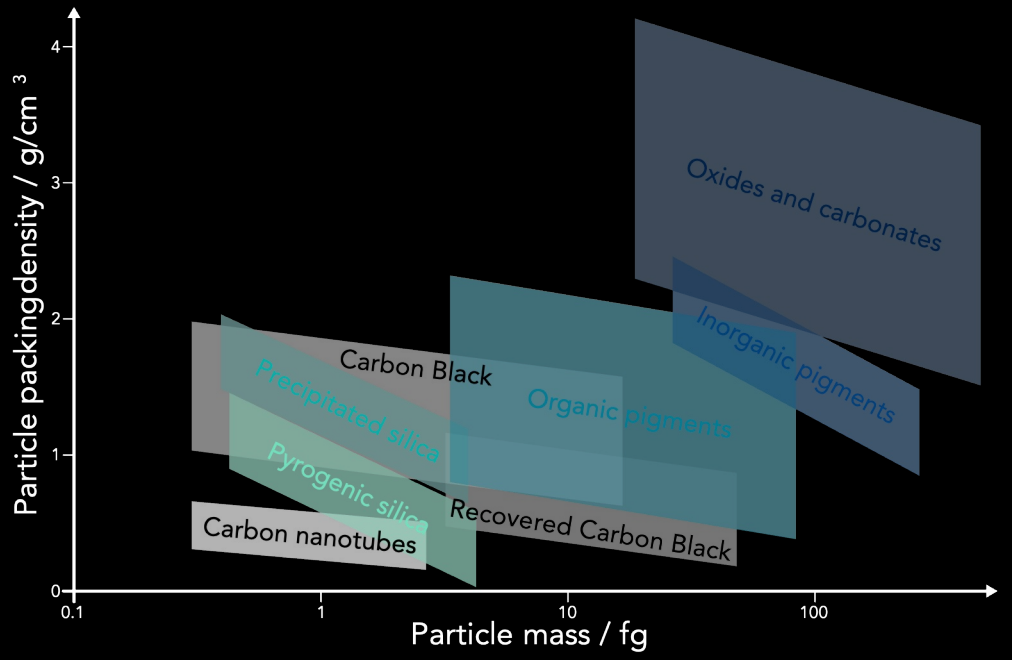

Solutions to Your Analytical Challenges

Instrument sales & integration

PowMaster and picoG-based instruments available for lab and process control deployment

- *Start with pilot analysis at our labs in Zurich*
- *Test our upcoming real-time monitoring solutions on-site at your facilities*

Special R&D projects

Tailored to your needs we provide our solutions from Zurich or on-site

Consulting and education

Benefit from femtoG's expertise to support your projects via expert calls and webinars

Get in touch today:

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