

Method for in-line quality control of engineered inorganic nanoparticle production processes

Ref. Nr

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Keywords

Nanoparticle, quality control, mass spectrometry

Intellectual Property

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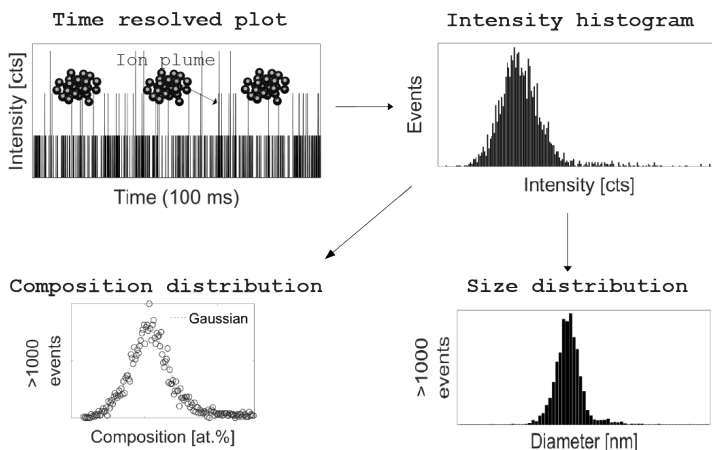
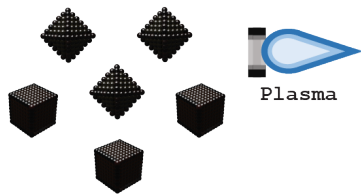
Publications

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Nebulized nanoparticles



Description

Engineered inorganic nanoparticles (EINPs) are making a breakthrough in various applications such as LED devices, (bio)sensors, and as catalysts. Since their properties are strongly variable with particle size, composition and shape, production processes need to be precisely controlled and monitored to ensure batch-to-batch uniformity. Currently, quality control is achieved with a multitude of analytical tools including UV-Vis spectroscopy, electron microscopy, dynamic light scattering, zeta potential etc. and are batch limited. This results in long lead times and a high risk of down time. The technology is a new inductively-coupled plasma mass spectrometry (ICP-MS) based method that allows for the comprehensive in-line characterization of EINPs with a single technique and at single-particle level of detection. Particle size and composition distributions can be obtained in a single measurement and with ensemble representative statistics. The method presented is compatible with both organic and

aqueous solvents, and has sensitivity for >90 elements.

Advantages

- Offers size and composition distributions with a single measurement
- >500 EINP detected per minute
- Sensitive for >90 elements
- Compatible with organic and aqueous solvents
- Offers in-line monitoring.
- Mitigates risk of EINP production down time and significantly reduces lead times.

Applications

- Any EINP and in particular:
 - Upconversion NPs (NaYF₄, LiYF₄, etc.)
 - Transition metal(oxide) NPs (Cu, Rh, Pd, etc.)
 - Rare-earth elemental NPs (La, Sc, Yb, etc.)