Measuring Size Distributions of Small-Scale Objects

Tech ID: 23800 / UC Case 2013-900-0

SUMMARY

Dr. Thomas Mason and colleagues at UCLA have created a kit, method, and algorithm for measuring size distributions and pH-dependent electrophoretic mobility distributions, thereby revealing types of stabilizing surface groups, of dispersions of small-scale colloidal objects, including nanoparticles and nanoemulsions.

BACKGROUND

Gel electrophoresis is a classic method for separating and sizing various biomolecules such as nucleic acids and proteins. However, the approach has not been used effectively to accurately obtain size distributions for common types of non-polymeric small-scale objects, such as nanoparticles and nanodroplets. This is because these objects frequently become trapped in standard gels, as ordinarily prepared for biomolecules, Moreover, their complex transport can cause smearing, making it impossible to obtain accurate size distributions. While some recent work has been done on electrophoresis of polyelectrolytes and nanoparticles, no work has properly handled the trapping and smearing effects that prohibit accurate size distribution measurements much less demonstrate calibrated size-distribution measurements of dispersed nanoscale objects using a specialized deconvolution method.

INNOVATION

Dr. Thomas Mason and colleagues from the chemistry and biochemistry department have developed a kit, method, and algorithm for accurately accounting for trapping and smearing during electrophoresis of small-scale objects such as nanoparticles that permits accurate measurements of particle size distributions. Novel gel passivation coupled with an iterative deconvolution technique developed using innovative algorithms now permits researchers to obtain accurate size distributions and electrophoretic mobility distributions of nano-scale objects.

APPLICATIONS

- Small-scale objects sizing, including nanoparticles and nanodroplets
- Research/Testing/Purification

ADVANTAGES

- Properly accounts for the combination of effects of passivation and smearing to provide highly accurate size distributions of nanoscale objects.
- Can be combined with existing electrophoresis devices.

STATE OF DEVELOPMENT

A working apparatus and algorithm have been developed that measure size and mobility distributions. Future work will enhance the user-friendliness and test more exotic particles to realize the extent of its capabilities.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,302,592	05/28/2019	2013-900

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INVENTORS

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OTHER INFORMATION

KEYWORDS

Electrophoresis, mobility, size, distribution, particle, small, electrophoretic, nanoparticle, gel, light-scattering, nucleic acid, protein, biomolecule, monodisperse, polydisperse

CATEGORIZED AS

- **Biotechnology**
  - Genomics
  - Other
  - Proteomics
- **Nanotechnology**
  - NanoBio
  - Tools and Devices
- **Research Tools**
  - Nucleic Acids/DNA/RNA
  - Other
  - Screening Assays
- **Sensors & Instrumentation**
  - Physical Measurement
  - Scientific/Research

RELATED CASES

2013-900-0

RELATED MATERIALS

- Smooth passage: Separating nanoparticles with passivated gel electrophoresis - 07/21/2014

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Process For Recycling Surfactant In Nanoemulsion Production
- Method of Making Multicomponent Nanoemulsions
- Novel Multi-Scale Pre-Assembled Phases of Matter
- Ultrastable Nanoemulsions In Disordered And Ordered States
- Shape-Controlled Particles Having Subparticle Geometrical Features

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