

Zeta Potential Insights

unique insights for world-class zeta potential measurement



Three Things You Need To Know

written by John F. Miller PhD, ENLIGHTEN SCIENTIFIC LLC

Are you thinking of buying a zeta potential light scattering instrument? Do you have a solid case as to why? Is it just the "done thing" to measure zeta potential regardless? Do you have an instrument already? Are you using it? Do you trust it? How confident are you with decisions you take based on the data? Most instruments are sold as black boxes, used as such, and often end up unused as white elephants. I've seen this happen in just one part of one company many times. Across one industry, millions of dollars are likely wasted annually. Why? How can you prevent this from happening to you?

Instrument



Science

Organization

Your instrument. Your science. Your organization. These are the three things you need to know. And you need to know the dependencies between each. It is common to buy equipment without careful consideration of its suitability for your specific needs. i.e., the science of your products. Business culture and politics also affect the choice of instrument and the credibility stakeholders place on conclusions drawn from data. The following three pages list the questions you should ask. Take some time to consider them. Ask yourself if you can make an informed decision about the most appropriate equipment for your needs. Does (or will) an instrument provide value or is it just a case of checking a box to satisfy your stakeholders? You need to know.

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Instrument

- Can it measure YOUR samples?
- Can you get a loaner?
- Would you be concerned about confidentiality?
- Would you be able to test active material with a loaner or during a demonstration?
- How do you know it measures YOUR samples confidently?
- Do you need a GMP-validated instrument?
- Do you need to lock down the instrument?
- Do you need flexibility to vary operating parameters?
- What kinds of samples are important to YOU – polar, nonpolar, high ionic strength?
- How many makes and models will you try?
- Do you know how the instruments work – the concepts and the vendor-specific differences?
- Remember – vendors are out to sell you a \$40K+ instrument, not solve YOUR unique problems.

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Science

- Do you understand the science of your samples?
- How do you dilute them and get meaningful results?
- In a multicomponent system, how do you know which component you are measuring?
- Is it the right one?
- Does measuring zeta potential of your samples using light scattering make sense?
- Why are you measuring it?
- How will the information be used?
- Do you need accurate results with good precision or is it sufficient to have consistent relative results?
- Will an instrument even be of use for YOUR samples?

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Organization

- Does your organization have a vendor bias?
- Have you demonstrated a specific brand provides more useful information for your specific case than others?
- Do you hit a brick wall trying to make your case?
- Do your stakeholders make expensive wrong decisions due to lack of understanding of the science, the instrument, and their interactions?
- Do you lack experts in colloid science and light scattering to ensure your investment is used to maximum advantage?
- Do you know if there are such experts beyond your immediate part of the organization?
- Does your local business culture favor a black box approach to using expensive instruments?
- Do you have new instruments sitting idle and unused for months or even years?

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How I can help you

Being able to answer the preceding questions is essential for procuring a new instrument appropriate for your needs. You must be confident in the data you generate and that they add value to your organization's decisions.

My knowledge of the measurement of zeta potential using electrophoretic light scattering (ELS) is unsurpassed by any manufacturer of commercial equipment or academic researchers.

I invented Phase Analysis Light Scattering (PALS) in the late 1980s. I worked with Brookhaven Instruments Corporation to develop their ZetaPALS instrument – the successor to the highly popular ZetaPlus instrument. The ZetaPALS was launched in the late 1990s, some years ahead of the other manufacturers of PALS-based light scattering instruments.

PALS has become the de facto method for measuring zeta potentials of charged particles in a wide range of liquid media. At least five companies market electrophoretic light scattering (ELS) instruments that use variants of PALS. These illustrate my preeminence in this field.

I offer help in the following areas:

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Best practices training

I can work with you to gain a better understanding of the principles of LDE and PALS measurements, how instrument parameters can influence results, and how to interpret data, particularly under challenging conditions.

This training can be on site or remotely via Skype etc.

[See my main website for more information](#)

Method development

The black box nature of commercial instruments often involves automatic selection of important instrument parameters. The problem with this is that some samples may have an apparent zeta potential that is dependent upon some of those parameters. Users are unaware of this.

I can help you identify the appropriate operating conditions that will maximize the robustness and confidence of your zeta potential data.

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Data analysis

Commercial instruments are designed for easy user operation. This can lead to misinterpretation of results. I have detected significant underestimation of zeta potential with current commercial instruments. Manufacturers have not acknowledged this or are unaware of it. I have a unique understanding of the causal factors and – more importantly – can identify their presence. I can show you how to detect undesirable phenomena and gauge the validity of a measurement.

[See my main website for more information](#)

Suitability for high ionic strength

Determination of zeta potential at physiological ionic strengths and higher (>0.15 molar) is becoming increasingly important in industries such as wastewater treatment, desalination, and dispersions for intravenous administration of nanomedicines and other nanomaterials. Commercial instruments fail to make measurements under such conditions with acceptable confidence.

Only I have the knowledge and capability to make such measurements correctly.

I can determine if your commercial instrument can generate data for your unique samples that can be used to support your business decisions with confidence.

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Next Generation Electrophoretic Light Scattering (NG-ELS) analysis

You may have samples that cannot be measured with commercial instruments due to high ionic strength. My NG-ELS can.

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Commercial instruments with PALS capability

These are the currently available commercial instruments that implement the PALS method for zeta potential estimation. Some also feature the older LDE technique. Other instruments are available that only incorporate LDE.

Nicomp ZLS Z3000

Particle Sizing Systems
8203 Kristel Circle
Port Richey FL 34668
United States

NanoBrook ZetaPALS

Brookhaven Instruments Corporation
750 Blue Point Road
Holtsville NY 11742
United States

Mobius

Wyatt Technology Corporation
6330 Hollister Ave
Santa Barbara CA 93117
United States

DelsaMax PRO

Beckman-Coulter Inc
Life Sciences Division Headquarters
5350 Lakeview Parkway S Drive
Indianapolis IN 46268
United States

Zetasizer Nano ZS, Pro, Ultra

Malvern Panalytical Inc
117 Flanders Road
Westborough MA 01581-1042
United States

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About ENLIGHTEN SCIENTIFIC

I provide experience-based consulting and educational services to clients involved in the development and manufacture of colloid-based products.

I want to dispel the idea that colloid science is complicated, too academic, and difficult to implement.

Most consulting services do not have the long industrial experience or the skills to teach the concepts in an easy-to-digest manner. I do.

I am the inventor of Phase Analysis Light Scattering (PALS) and a foremost authority on the measurement of zeta potential using dynamic light scattering.



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