

## **CENTRE FOR FOOD NANOTECHNOLOGY**

Center for Food nanotechnology represents a significant step towards the development and diversification of Nano Food Technology at Karpagam Academy of Higher Education in Coimbatore. Currently, several projects are underway in this field, and our plan is to involve undergraduate students, postgraduate students, and Junior Research Fellows in managing these projects at the center. This effort aims to introduce new inventions and interventions in the study of Nano Food Technology.

Nanotechnology, a cutting-edge technology that emerged in India approximately 16 years ago, has paved the way for a new realm known as Nano food technology with extensive possibilities. The establishment of this center is driven by the progressive aspects of both nanotechnology and food technology fields. Although the center is relatively new, we can conduct diverse research, such as the study of biomaterials and nanomaterials, which will lead to the development of innovative products. The center's primary objective is to promote and foster interdisciplinary research activities across various engineering fields.

The center's research focus encompasses several areas, including Nanoencapsulation, Nanostructures, Nanocomposites, Nano food fortification, and Nano formulations. These areas will drive our efforts to explore and develop new advancements in Nano Food Technology.

### **Vision**

Our vision is to become a distinguished hub for research, education, and training in the field of Food Nanotechnology. We aim to establish strong connections with processing industries, academic institutions, and research and development organizations to effectively accomplish our goals of creating cutting-edge technologies.

### **Mission**

To foster concentrated and exceptional research in the field of Nanoscience and Nanotechnology, providing support to researchers working in this area.

To conduct and facilitate research, development, design, and engineering in nanotechnology with the ultimate goal of transferring the technology to the industrial sector.

To transfer the knowledge gained in nanoscience and nanotechnology to the industrial sector, while also ensuring accurate information dissemination to the public. Through collaborative projects with academia and industries.

## **FACILITIES IN CENTRE FOR FOOD NANOTECHNOLOGY**

### **ZETASIZER ULTRA**

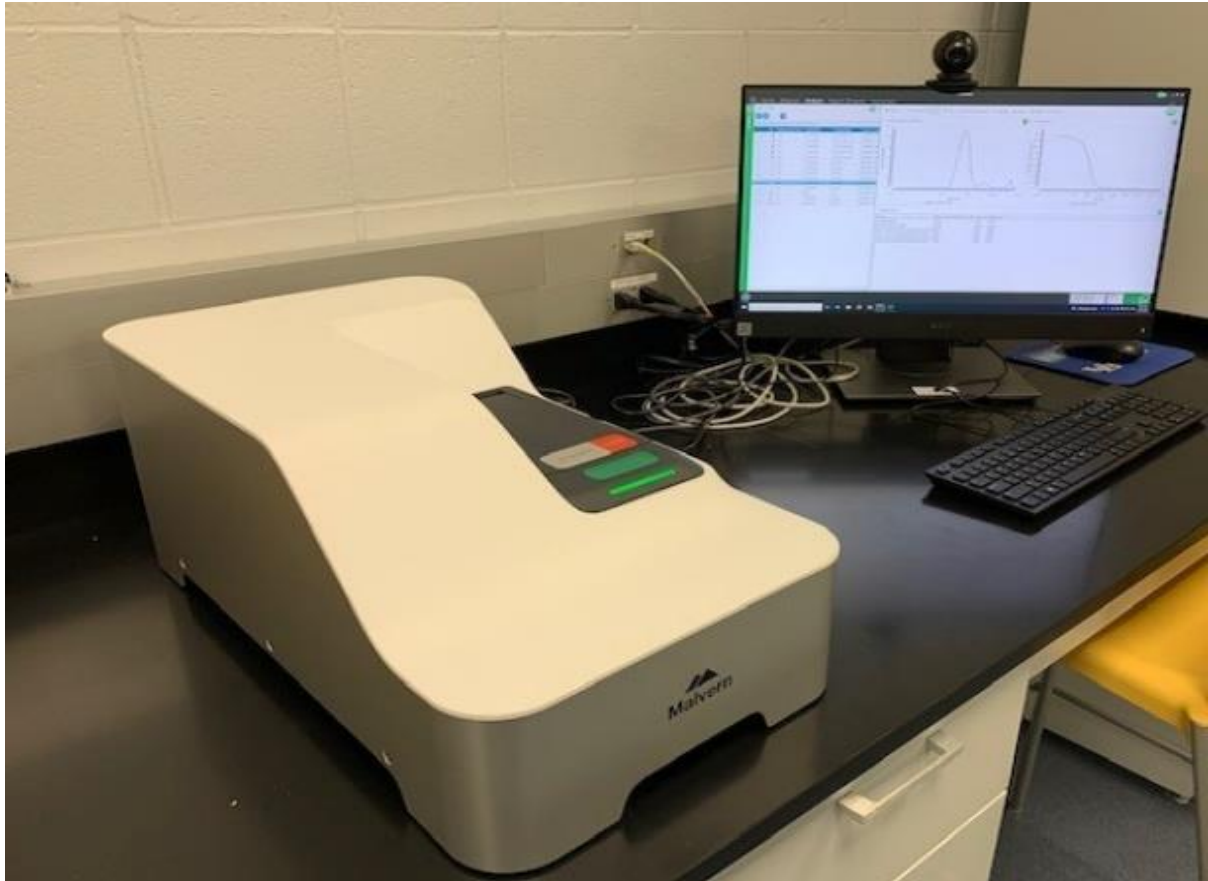
Zetasizer Ultra, stands as our pinnacle system for measuring particle and molecular size, particle charge, and particle concentration. It embodies the utmost intelligence and versatility, solidifying its position as the most advanced and adaptable instrument within the Zetasizer Advance range.



- Multi-Angle Dynamic Light Scattering (MADLS) for absolute confidence in particle and molecular size distribution analysis.

- Dynamic Light Scattering (DLS) measures particle and molecule size, from below 1 nm to 10  $\mu\text{m}$ .
- Electrophoretic Light Scattering (ELS) measures the zeta potential of particles and molecules, indicating sample stability and/or propensity to aggregate.
- Non-Invasive Back Scatter (NIBS) optics for versatile, high sensitivity, particle and molecular size measurements.
- Simple, per-peak concentration / titer measurements (Red Label only).
- Disposable capillary sizing cell provides the ultimate in non-destructive, low volume (down to 3  $\mu\text{L}$ ) analysis, with an upper size range that extends to 10  $\mu\text{m}$ .
- M3-PALS with Constant Current Mode for zeta potential and electrophoretic mobility measurements.
- ZS Xplorer software suite for simple and flexible method set-up and data analysis
- Adaptive Correlation for faster, more reproducible sizing measurements with less sample preparation.
- Deep Learning empowered data quality system for assessment of any size data quality issues, with clear advice on how to improve results.
- Optical filter wheel with fluorescence filter to allow measurement of fluorescent samples without impairing overall system sensitivity. Also includes polarization filters for DDLS measurements.
- The optional MPT-3 Autotitrator enables study of the effect of changes in pH.

**Zetasizer - Malvern Panalytical Advance Ultra (Red Label)**



The Malvern Panalytical Zetasizer Advance Ultra (Red Label) is a cutting-edge light scattering system designed for measuring particle and molecular size, particle charge, and particle concentration. It offers exceptional versatility, accommodating a wide range of materials, including challenging-to-measure viruses and virus-like particles (VLPs). With minimal or no dilution required, this system ensures convenient and swift usage.

The integration of non-invasive backscatter (NIBS) and multi-angle dynamic light scattering (MADLS®) technologies empowers precise characterization of samples across a broad size range (1nm-15µm), even at low concentrations and small volumes (starting from 3µl). MADLS® capability is particularly valuable for extending the size range and analyzing materials with diverse size distributions. This capability proves especially advantageous for nanomaterial research, particularly in the field of biomedical applications.

MADLS® delivers an angular-independent particle size distribution (PSD) with enhanced resolution by incorporating scattering data from multiple angles. This technology enables an automated series of single-angle measurements, including backscatter, side scatter, and forward scatter, which are combined to provide a comprehensive PSD analysis.

### **Particle size and molecular size**

Measurement principle	Non-Invasive Back Scatter (NIBS) Dynamic Light Scattering Dynamic Light Scattering (90° and 13°) Multi-Angle Dynamic Light Scattering (MADLS)
Measurement angle	173°, 13°, 90°
Measurement range	Diameter: 0.3 nm – 15 µm (2) (9)
Minimum sample volume	3 µL
Concentration range	Minimum sample concentration: Red Label: 0.1 mg/mL 15 kDa Protein MADLS: 0.1 mg/ml 15 kDa Protein MADLS Particle Concentration Enabled? Red Label: Yes Maximum sample concentration(3): 40% w/v

### Zeta potential

Measurement principle	Mixed-Mode Measurement phase analysis light scattering (M3-PALS)
Size range	3.8 nm – 100 µm
Minimum sample volume	20 µL (4)
Concentration range	Red Label: 1 mg/mL (5) to 40% w/v (6)
Sample conductivity range	Maximum: 260 mS/cm

### Static Light Scattering (molecular weight)

Molecular weight range	980 Da – 20 MDa
Measurement principle	Static Light Scattering with Debye Plot (10)
Accuracy	+/- 10% typical

### Particle concentration

Measurement principle	Red Label: MADLS – Particle Concentration (Mie)
Concentration range	Red Label: $1 \times 10^8$ to $1 \times 10^{12}$ particles/mL
Calibration type	Red Label: Single point system calibration only

### System

Detector	Avalanche Photodiode
Laser safety	He-Ne (633 nm) Red label: 10 mW Max
Temperature control range	0°C to 120°C (7)
Dimensions (W, D, H)	322 mm x 565 mm x 245 mm
Weight	19 kg
Power	AC 100-240 V, 50-60 Hz, 4.0 A
Power consumption	Max 100 W, Typical 45 W
Ambient conditions	+10°C to +35°C, 35 – 80% RH (non-condensing)
Interface	USB 2.0 or higher