

CREATE KNOWLEDGE

A Comparative Analysis of Nanoparticle Measuring Techniques

INTRODUCTION

- The objective for the project is to establish a streamlined methodology for assessing the size stability of nanoparticles, ensuring reproducibility and consistency in drug delivery applications.
- This will be done by comparing the sizing results obtained from Dynamic Light Scattering (DLS) with Transmission Electron Microscopy (TEM), and Nanoparticle Tracking Analysis (NTA) to validate the accuracy and reliability of the rapid assessment.
- We used 2 types of nanoparticles for each of the 3 measurement techniques:
 - 100nm diameter Gold Nanoparticles from a stabilized citrate buffer suspension and diluted in deionized water.
 - The other type were Mesoporous Silica Nanoparticles (MSN) diluted in DI water.
- In the future, the sizing protocol could be integrated into existing computational models, enhancing predictive capabilities for drug release kinetics.



METHODOLOGY & RESULTS

Transmission Electron Microscopy (TEM) involves preparing a dilute solution of nanoparticles on a support grid, which is then targeted with a beam of electrons. As the electrons pass through the sample, they interact with the nanoparticles, revealing their structure. The resulting images can be magnified to extremely high levels, enabling precise measurement of nanoparticle size, shape, and distribution.

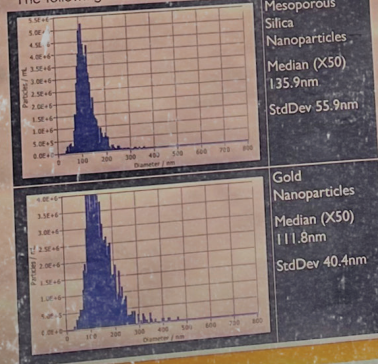
METHODOLOGY & RESULTS

The following images were obtained using TEM:



Nanoparticle Tracking Analysis (NTA) involves illuminating the sample with a laser and tracking the Brownian motion of individual nanoparticles under a microscope. Specialized software analyzes the particle trajectories to determine size and concentration. NTA offers high resolution and the ability to measure a wide size range.

The following data was obtained using NTA:



METHODOLOGY & RESULTS

Dynamic Light Scattering (DLS) involves analyzing the fluctuations in light intensity caused by Brownian motion of nanoparticles through the sample illuminated by a laser. The resulting scattered light is analyzed for intensity fluctuations, correlating the information to particle size.

Mesoporous Silica Nanoparticles (in DI water)

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