



Size Determination of Liposomes used in Drug Delivery Systems

NanoSight instruments accurately and rapidly size liposomes in water requiring only small volumes and very little sample preparation.

Background

The use and potential of liposomes (fig. 1) as drug deliverers continues to grow in importance. The reasons are clear:-

- Drugs delivered via liposomes may be protected from the actions of metabolizing enzymes.
- Lipophilic drugs may be made soluble.
- Drugs can be targeted to specific areas by attaching ligands to the liposome.
- Liposomes are readily absorbed by cells.
- The rate of drug release may be controlled by the selection of liposome.

Using liposomes as a drug deliverer allows potentially lower doses of drug to be used, reducing toxicity and side-effects. Furthermore, it is possible that gene therapy drugs may be delivered by liposomes.

The size of the liposomes is increasingly being recognised as an important factor in treatment efficacy. The size of the liposome used in drug delivery may affect its circulation and residence time in the blood, the efficacy of the targeting, the rate of cell absorption (or endocytosis) and, ultimately, the successful release of its payload. Such size considerations are also hugely important to nanoscale polymer-encapsulated drug delivery systems. Accurate measurement of the particles being administered is therefore imperative.

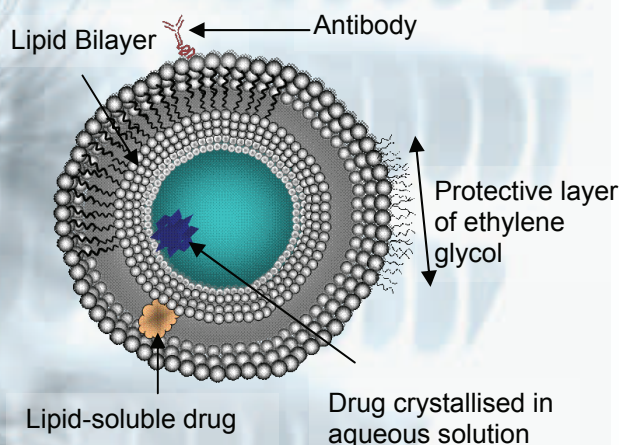


Figure 1: Typical Liposome Structure.

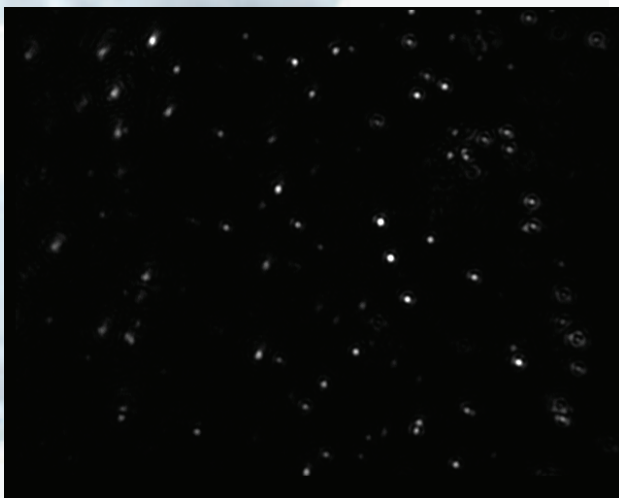


Figure 2: Typical image of liposomes provided by a NanoSight instrument. The system enables individual liposomes in suspension to be visualized and their Brownian motion tracked – enabling particle size distributions, based on individual particles, to be built up in a matter of seconds.



NANOSIGHT



Sizing by NanoSight Systems

Whilst the NanoSight viewing unit provides a **unique view** of the nanoparticles (fig. 2), the Nanoparticle Tracking and Analysis software suite (NTA 3.1) is used to **accurately size the liposomes** (fig. 3).

Sample preparation requires dilution to approximately 10^9 particles/ml. From this, a sample of less than 500 μ l is taken and injected into the viewing unit. Aligning and focussing of the imaging unit is rapid, as is setting the capture and analysis settings.

The system provides the unique ability for providing a number or volume-based size distribution of the sample along with a range of statistical measurements.

Key features

- Particles can be measured in their natural state (no drying/vacuum conditions required).
- Greater ability to size polydisperse samples due to the insensitivity to intensity (commonly associated with other light scattering techniques).
- Small sample volume.
- Low cost of unit.
- Visualisation of individual particles without any pre-treatment such as labelling.
- Ability to rapidly analyse time characteristics of the sample such as agglomeration/stability.

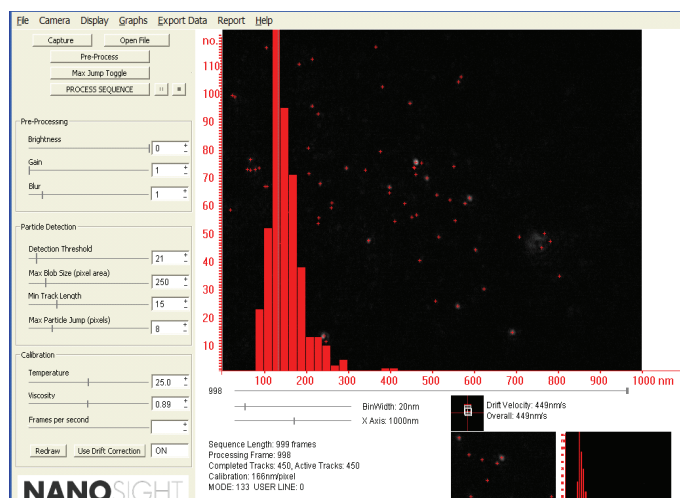


Figure 3: Particle size histogram obtained by NanoSight from a 33 second video of liposomes. As can be seen, this sample is relatively monodisperse with a modal size of 133nm.

Contact details

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Distributor details

...seeing is believing