STUNNER

LNP Characterization

Conquer LNP characterization

Stunner is the only system that pulls together UV/Vis concentration, rotating angle dynamic light scattering (RADLS) and multi-angle light scattering data on the same 2 µL sample. Nail down your lipid nanoparticle quality by knocking particle concentration, size, mass, detection of aggregates and total RNA off your list in one shot. Without skipping a beat, you'll know if your nanoparticle is good to go.

- Sizing & polydispersity
- Particle concentration
- Aggregation
- Total RNA quant

Teeny sample, tons of info

Just load 2 µL of sample in a Stunner plate – don't bother with sample prep or dilution. Each microfluidic circuit has two fixed pathlengths built-in to cover a wide dynamic range of 0.03-275 OD. If you're dealing with a full plate, get 96 concentration measurements in 10 minutes – add on sizing from multiple angles and have it all done in around two hours. For even heavier workflows, hook it up to your favorite robot to add more oomph.
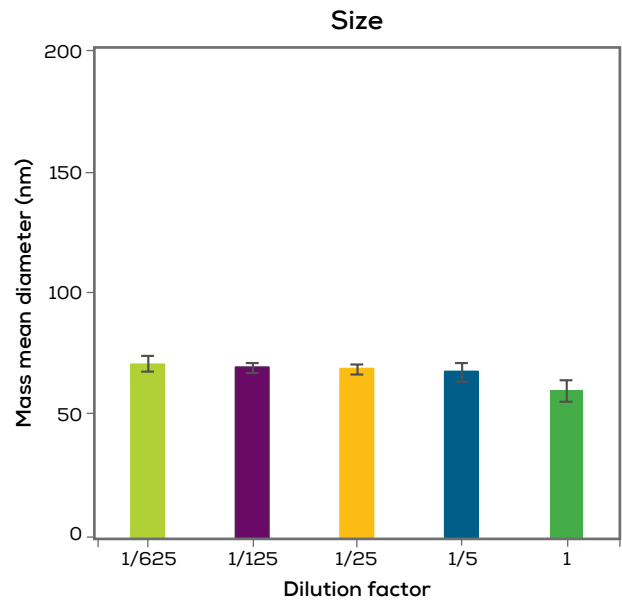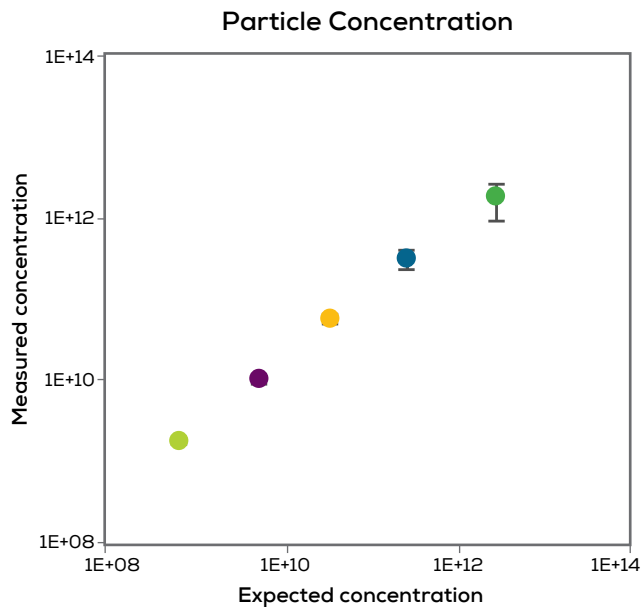
UV/Vis concentration

Wavelength (nm)

0.7 mm

0.1 mm

Fit-for-purpose DLS

Hydrodynamic diameter (nm)
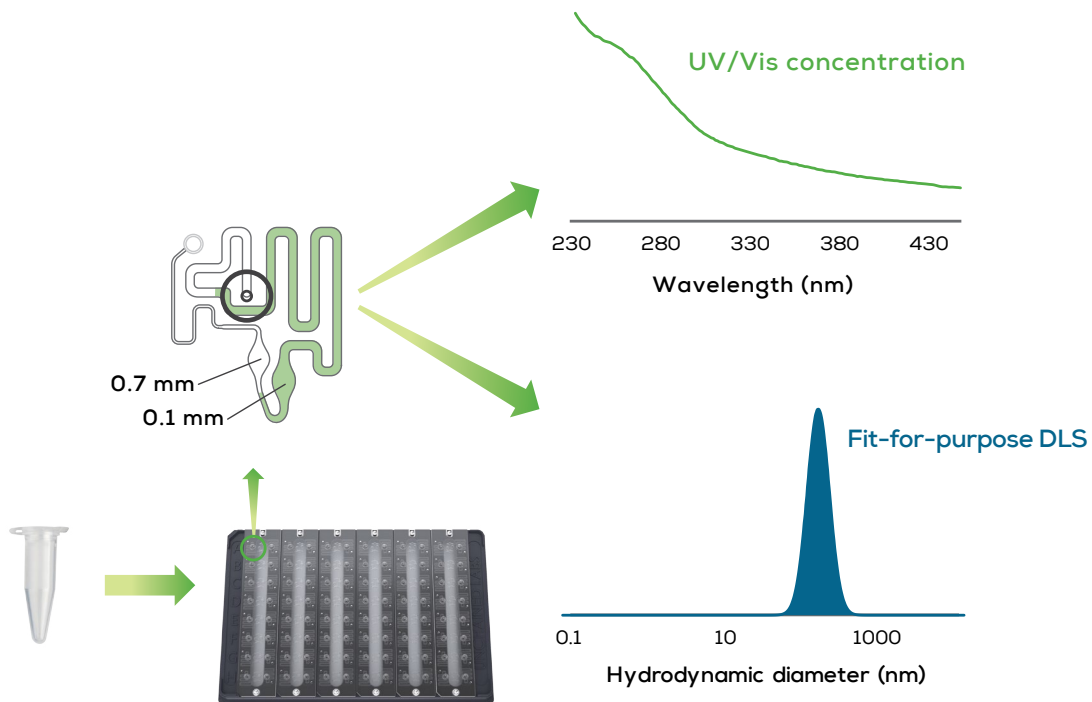
LNP sizing & quant in one shot

Stunner sizes up and counts your LNPs by combining DLS and SLS data from a bunch of different angles. Compare different formulations and mixing parameters to see which one gets you the perfect LNP size. From the same experiment, Stunner will tell you which one contains the most LNP particles. Be certain your LNPs are the size you were hoping for and that you have enough of them to see what they can do.
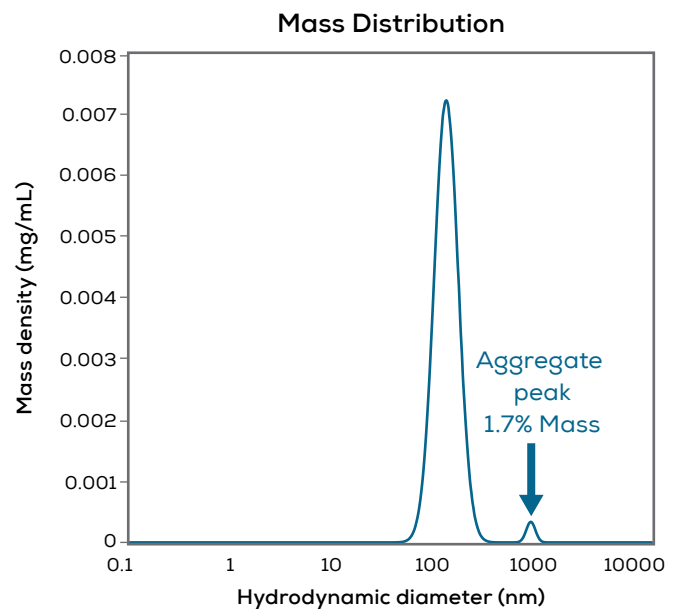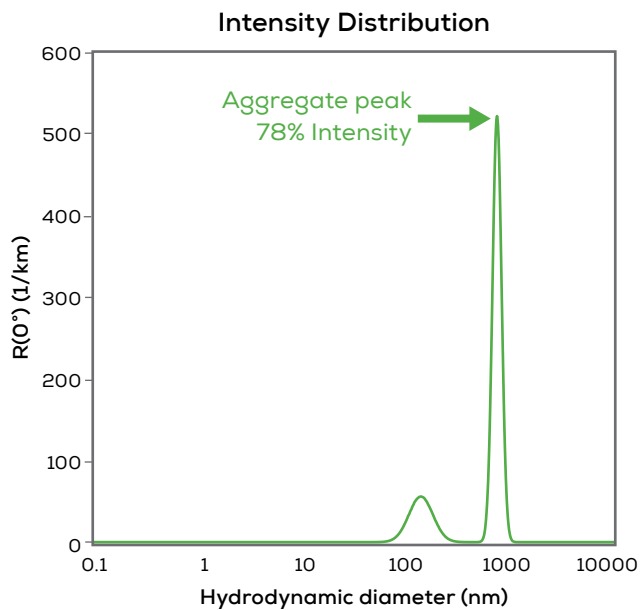
Particle Size

Particle Concentration
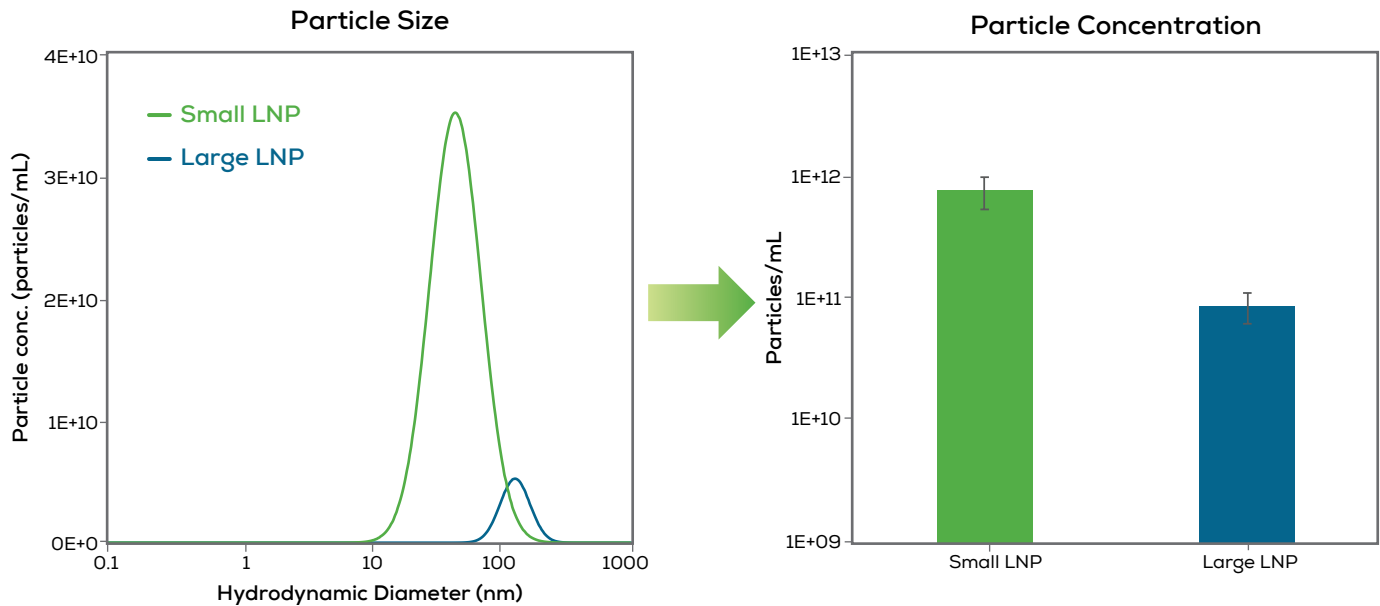
Count on it

No matter how large or how many LNPs you have, Stunner deals out accurate sizes and particle counts. Confirm the concentration after any dilution step and see how it affects the size of your LNPs. Keep a close eye on the concentration and size of your LNPs at every step in your process – from formulation screening to scale-up and everything in between.
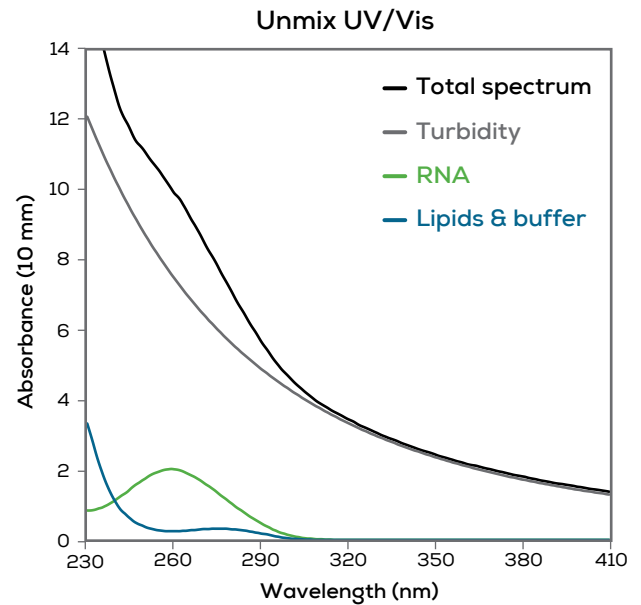
Particle Concentration

Measured concentration vs Expected concentration

Size

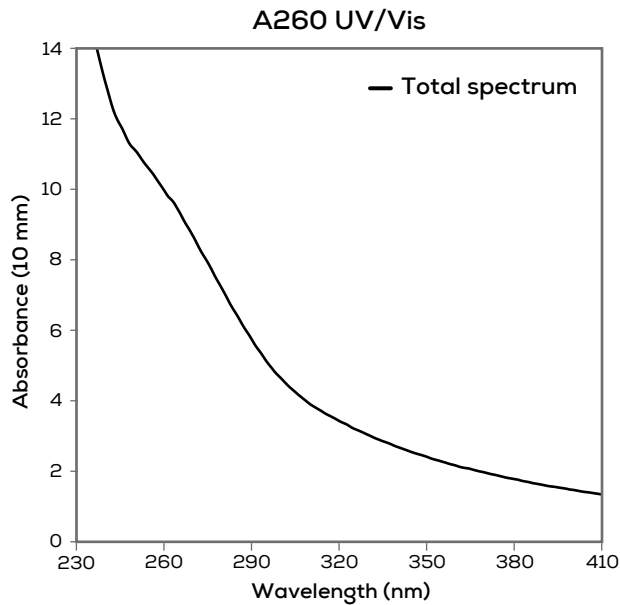Mass mean diameter (nm) vs Dilution factor

Know what's up

Stunner can catch even the tiniest bit of aggregation. Check out your LNP size by intensity distribution first and stay on the lookout for aggregates. If you see aggregation rearing its ugly head, make the switch to mass distribution to see how bad it might be. Beef up your sizing stats and never get fooled by rogue aggregates again.

See through the fog

Cloudy solutions of LNPs and other nanoparticles hang up other techniques but Stunner's short pathlengths teamed up with UV/Vis get you the answers you need. Cut through all that turbidity with Unmix and check out just the absorbance signal from your payload.

A260 UV/Vis

Absorbance (10 mm) vs Wavelength (nm)

— Total spectrum

Unmix UV/Vis

Absorbance (10 mm) vs Wavelength (nm)

— Total spectrum
— Turbidity
— RNA
— Lipids & buffer

Screen at light speed

Stunner and Sunscreen are the fastest tag-team for LNP screening. Sunscreen creates up to 96 different LNP formulations in 5 hours, then Stunner characterizes the need-to-know info on your LNPs in about 2 hours. Combine UV/Vis, DLS and SLS from multiple angles to get size, payload quant, particle concentration and the average amount of RNA molecules per particle. Stunner always tells the whole lipid nanoparticle story.
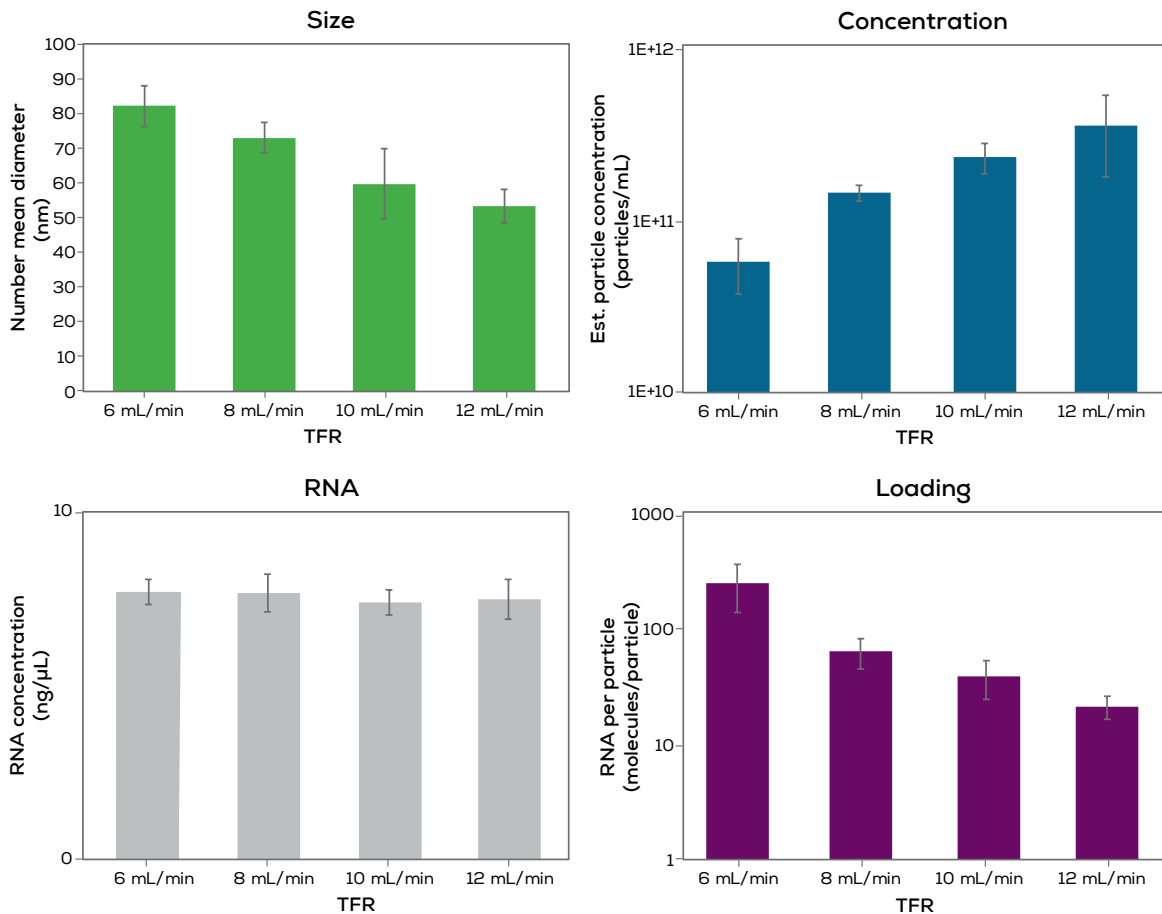
Specifications

Stunner instrument specifications	
Dimensions	37 cm W x 54 cm D x 33 cm H; 30.4 kg
Electrical	Universal input voltage 100-240 V AC, 50-60 Hz
Computer	Separate computer with Windows 11 included
Connection	USB, TCP/IP (Service)
Approval	CE, FCC, CSA
Regulatory compliance	Optional 21CFRp11 software package; USP and Ph. Eur. Performance verification standards

UV/Vis		
Light source	Xenon flash lamp	
Detectors	UV/Vis polychromatic spectrophotometer	
Wavelength range	230-750 nm	
Wavelength accuracy	≤400 nm: ±1 nm; ≥400 nm: ±2 nm	
Spectral resolution	Better than 2 nm (toluene in hexane)	
Absorbance precision (1 cm quartz cuvette)	‹1 OD: ±0.005 OD st dev	1-2 OD: ±0.5% CV
Absorbance accuracy (1 cm quartz cuvette)	‹1 OD: ±0.01 OD	1-2 OD: ±1%

DLS and rotating angle DLS	
Light source	2 x 660 nm laser diodes
Detection	Avalanche photodiode module
Number of angles	1 (DLS), 5 – 30 (RADLS)
Angular range	30-42° 110–162°
Size accuracy	±2%
Minimum sample concentration	0.1 mg/mL lysozyme
Hydrodynamic diameter range	0.3–1000 nm
Molecular weight range	1 kDa – 10 GDa
Particle concentration range	10^9 – 5×10^{13} particles/mL (dependent on particle size, determined on 80 nm beads)

Stunner plate specifications	
Samples per plate	96 (12 x 8 microplate format)
Sample retention time	Up to 2 hours
Recommended sample volume	2 µL
Pathlength(s)	0.1 mm & 0.7 mm path
Measurement time for full plate	~10 minutes for UV/Vis only ~1 hour for UV/Vis and DLS (5 x 4s x 1 angle) ~2 h 15 min for UV/Vis and RADLS (5 x 1s x 7 angles)

Measurement range:
   OD 10 mm
   ng/µL dsDNA
   mg/mL ave protein mix
	0.03–275 OD 10 mm
	 1.5–13750 ng/µL
	 0.03–275 mg/mL

Absorbance precision (10 mm pathlength)	‹1 OD: ±0.01 OD st dev 1–200 OD: ±1% CV
Absorbance accuracy (10 mm pathlength)	‹1 OD: ±0.02 OD 1–200 OD: ±2%

Unchained Labs
4747 Willow Rd
Pleasanton, CA 94588
Phone: 1.925.587.9800
Toll-free: 1.800.815.6384
Email: info@unchainedlabs.com

Rev B