Ver.FLMT34-R02-1.0

NanoAnalyzer

• Unmatched Performance • Superior Sensitivity • Innovation for NanoWorld

Size Distribution

Particle Concentration

Phenotyping

Multiparameter

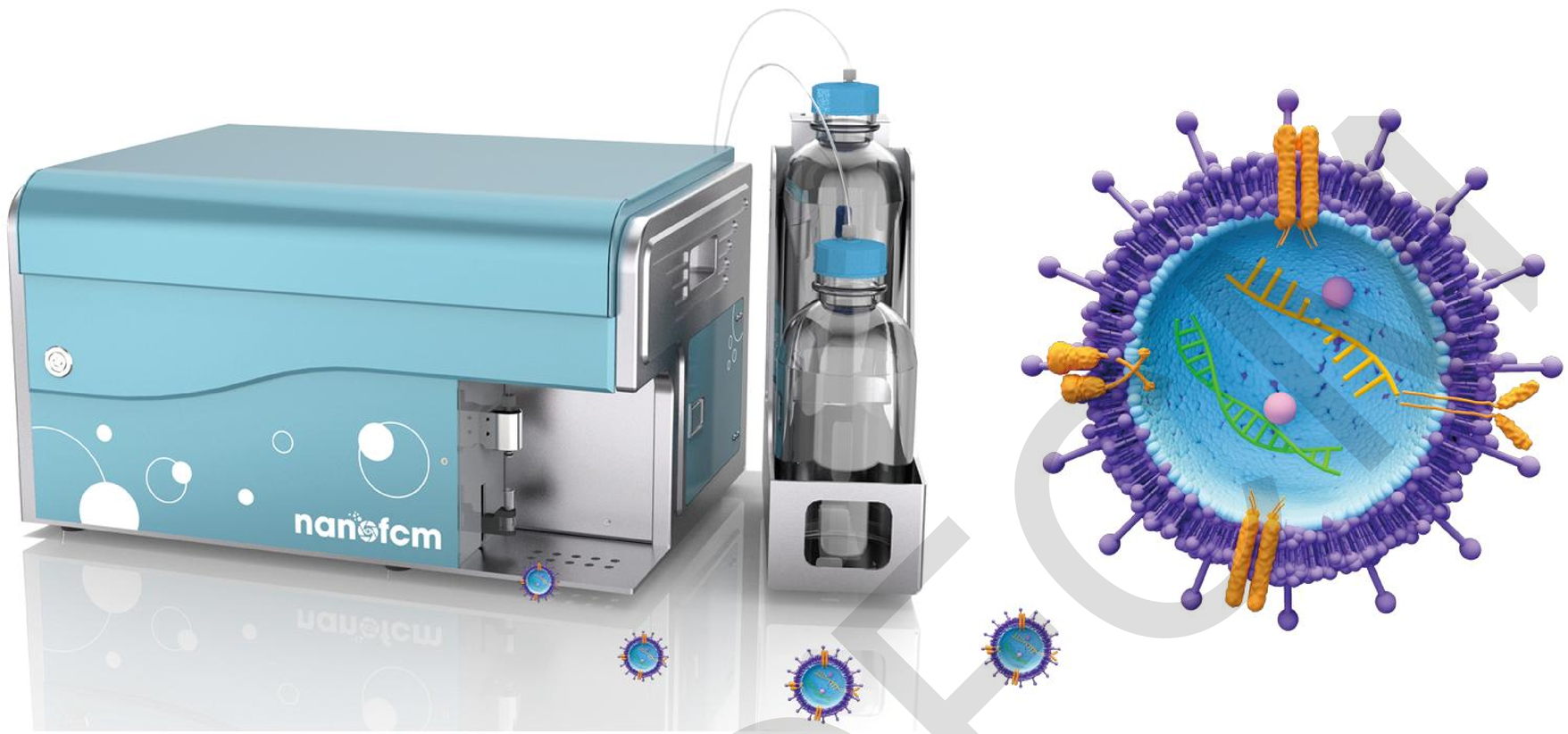
nanofcm

www.nanofcm.com

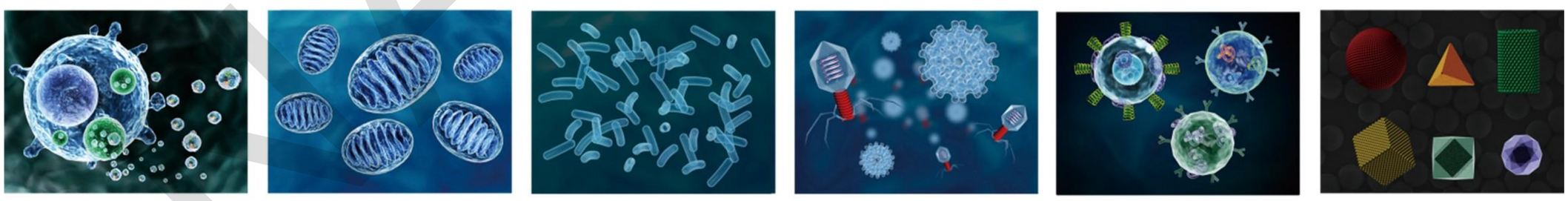
Flow NanoAnalyzer

High Sensitivity Flow Cytometry for Nanoparticle Analysis

Deciphering Bio-Nanoparticles (7-1000 nm)



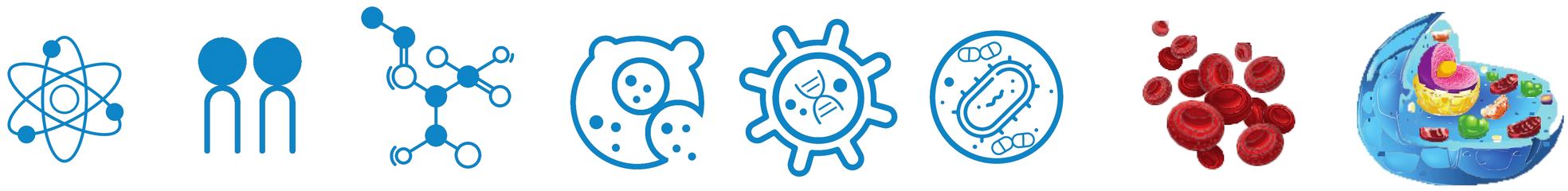
NanoAnalyzer is expected to become a powerful tool for life science, nanoscience and nanotechnology studies. NanoAnalyzer can be used for the multiparameter characterization of natural and synthetic nanoparticles (7-1000 nm) at the single-particle level, such as extracellular vesicles, mitochondria, bacteria, viruses, nanomedicines and nanomaterials. Combining light scattering and fluorescence detection, high-resolution distributions of particle size and biochemical properties can be acquired simultaneously in 1-2 minutes.



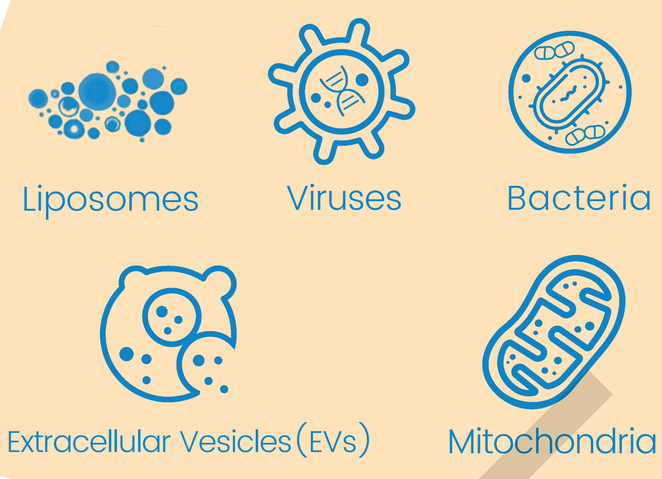
- Unprecedented Sensitivity for Scatter (24 nm) and Fluorescence (single PE).
- Multiparameter Analysis of Nanoparticles.
- Complementary to Conventional FCM in Size Below 200 nm.
- Covers the Entire Size Range of EVs.

Application Fields

Measurement range from 7 to 1000 nm



0.1nm 1nm 10nm 100nm 1µm 10µm 100µm



Application Areas:

- Diagnostics
- Therapeutics
  - Naive EVs &
  - Engineered EVs
- Cancer Treatment
- Fundamental Research

Data Required:

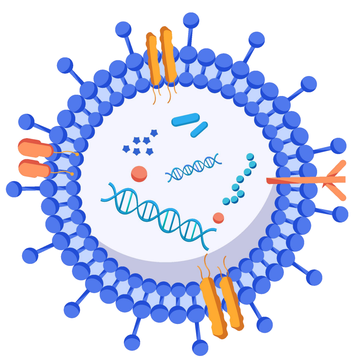
- Particle Size
- Concentration
  - Total Populations &
  - Sub Populations
- Surface Functionalities
- Cargo/Payload

Products & Services

NanoAnalyzer

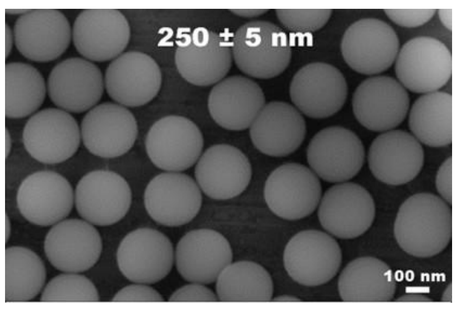
- Particle
- Size
- Concentration
- Phenotyping

Sample Analysis



- Chemotherapeutics
- Nuceic Acid
- Imaging Agent (FC, PET, MRI)
- Targeting Ligand

Silica Nanoparticles & Quality Control Beads

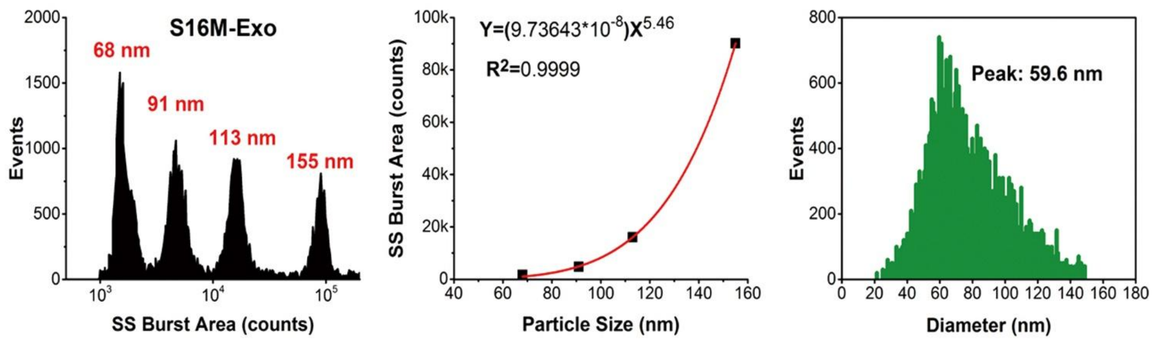


NanoFCM Quality Control Nanospheres Series with accurate size and concentration are designed both for adjusting the alignment of NanoAnalyzers and for use as an internal or external standard for sizing and concentration measurement.

NanoAnalyzer

Nano-Flow Cytometry: Next-Generation Platform for Comprehensive EV Analysis

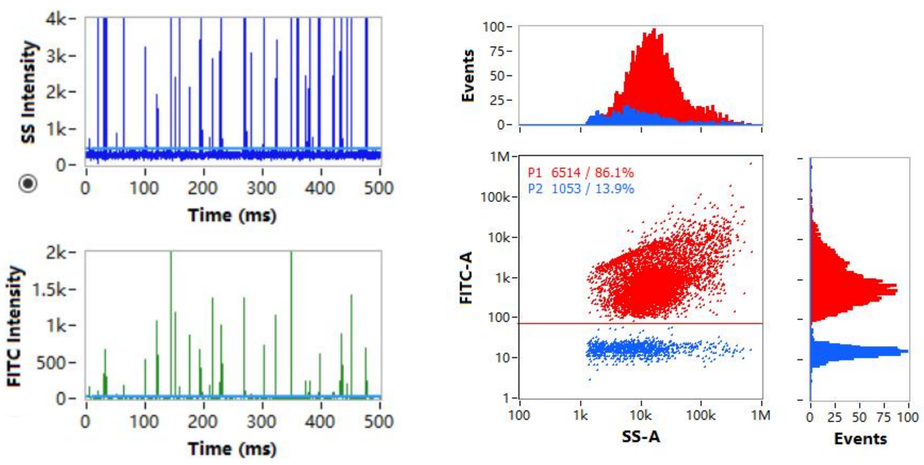
High-Resolution Size Distribution Analysis



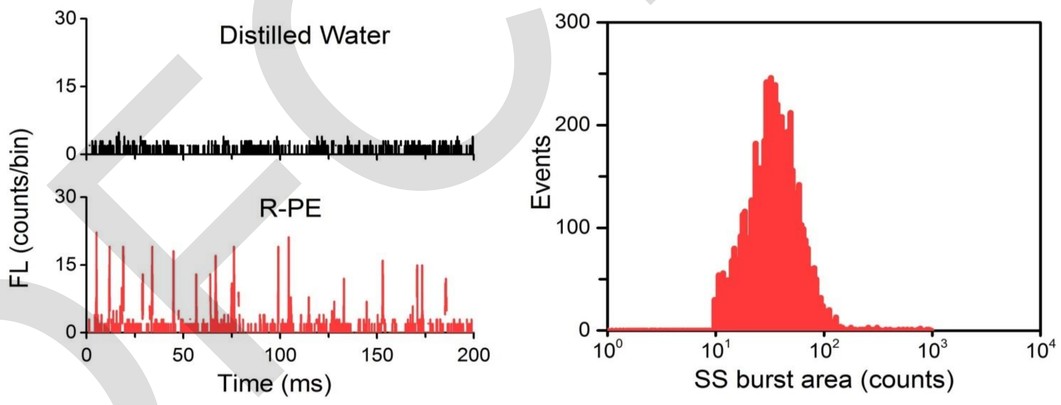
Employing **S16M-Exo** (NanoFCM) as size standards, a calibration curve will be constructed between the particle size and side scatter intensity, the SS intensity of each EV particle could be converted to size. The size distribution of EV matches well with that acquired from **Cryo-TEM**.

EVs Phenotyping at Single Particle Level

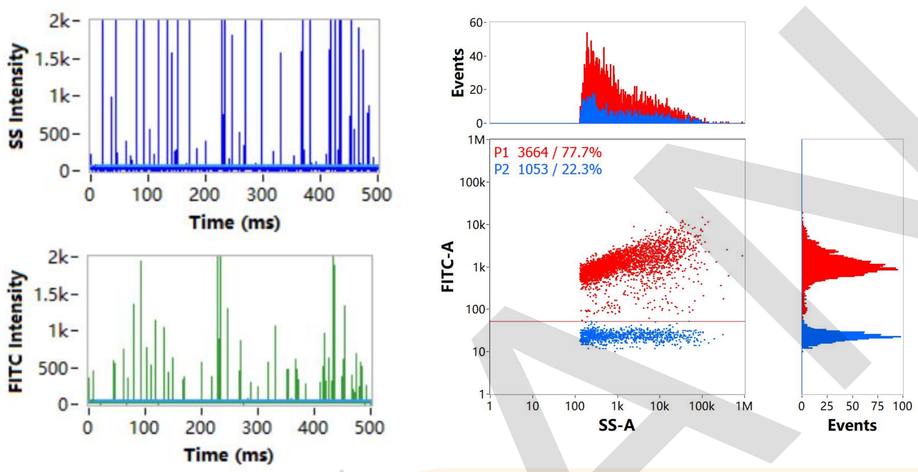
CD63-GFP



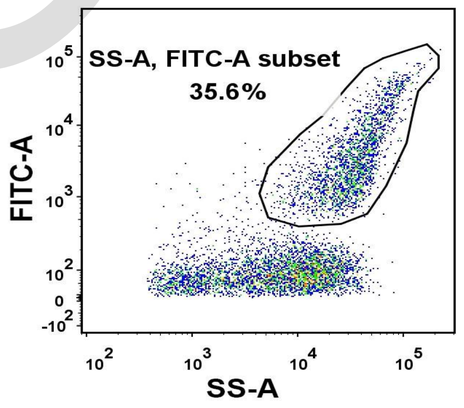
Single Molecule Detection



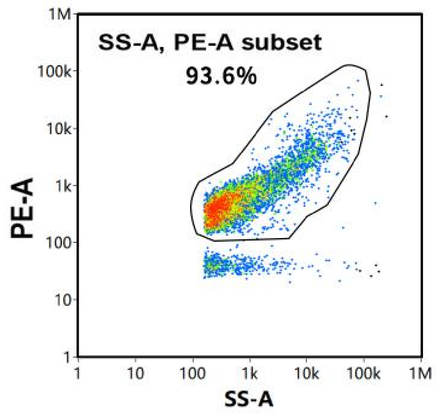
CD9-Alexa Fluor 488



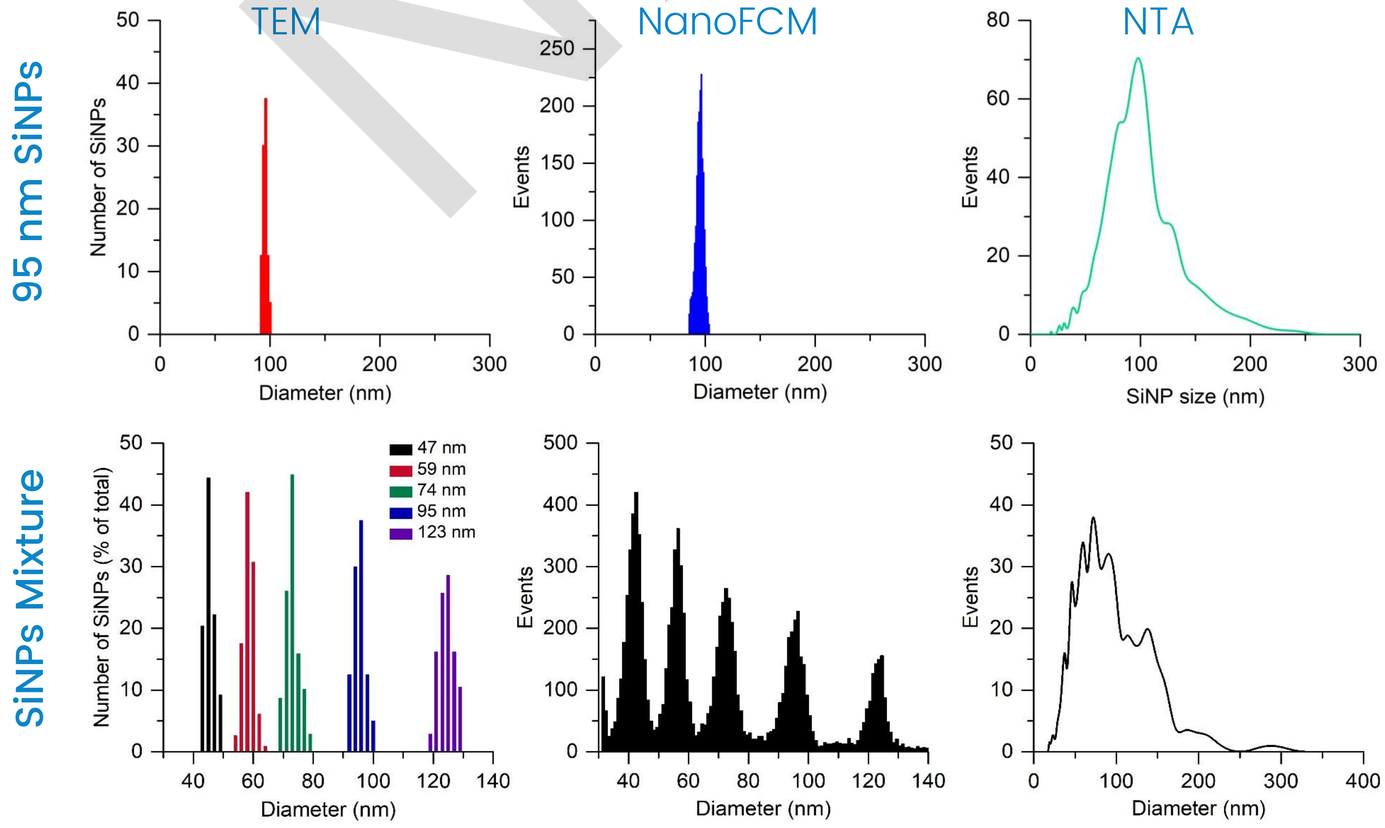
RNA



Lipid



Comparison with First-Generation Techniques



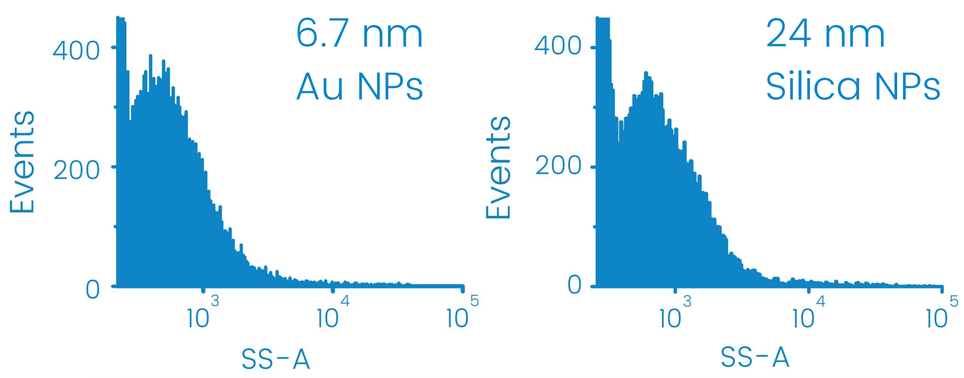
For silica NPs of 95 nm, the size distribution measured by NanoFCM is consistent with TEM, that is, sharp histogram centered at 95 nm is achieved. In contrast, a broad size distribution (20-250 nm) containing massive false signals is observed by NTA, originating from the lack of both sensitivity and resolution.

The ultrahigh sensitivity and resolution of NanoFCM is perfectly illustrated by the measurement of silica NPs with mixed sizes (47, 59, 74, 95, and 123 nm). NanoFCM offers comparable results as TEM, far beyond the best result obtained by NTA. NanoFCM enables users to accomplish complicate analysis for heterogeneous samples without losing details.

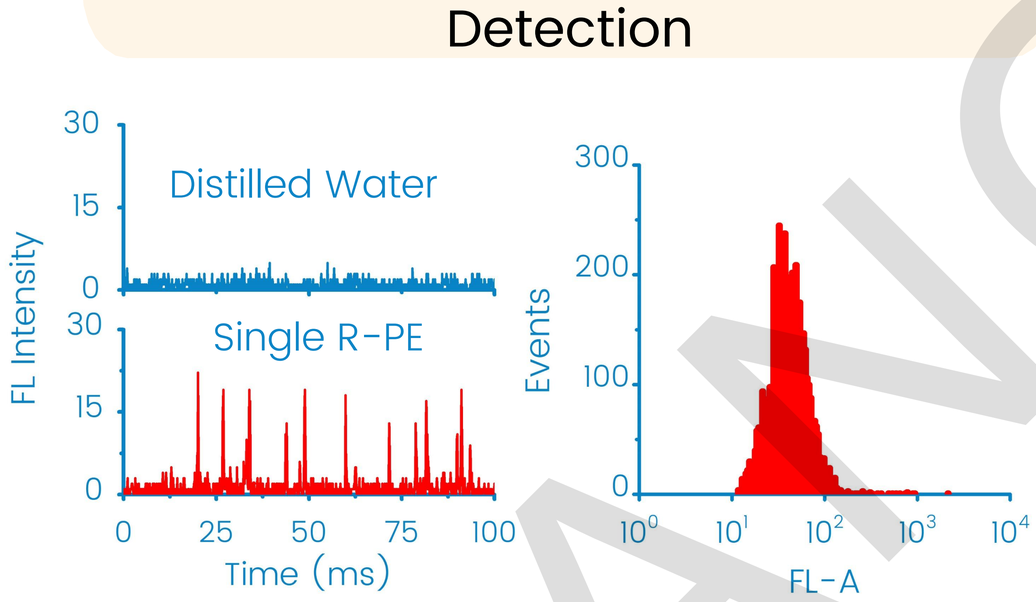
Performance

- SSC Sensitivity < 30 nm NPs
- SSC Resolution 40/50 nm NPs
- Fluorescence Sensitivity AF488 < 10
- Fluorescence Resolution 42/133 ERF
- Particle Size 7-1000 nm
- Sample Acquisition Rate 10,000 events/min

Sensitivity for Scattering Detection (7-1000 nm)

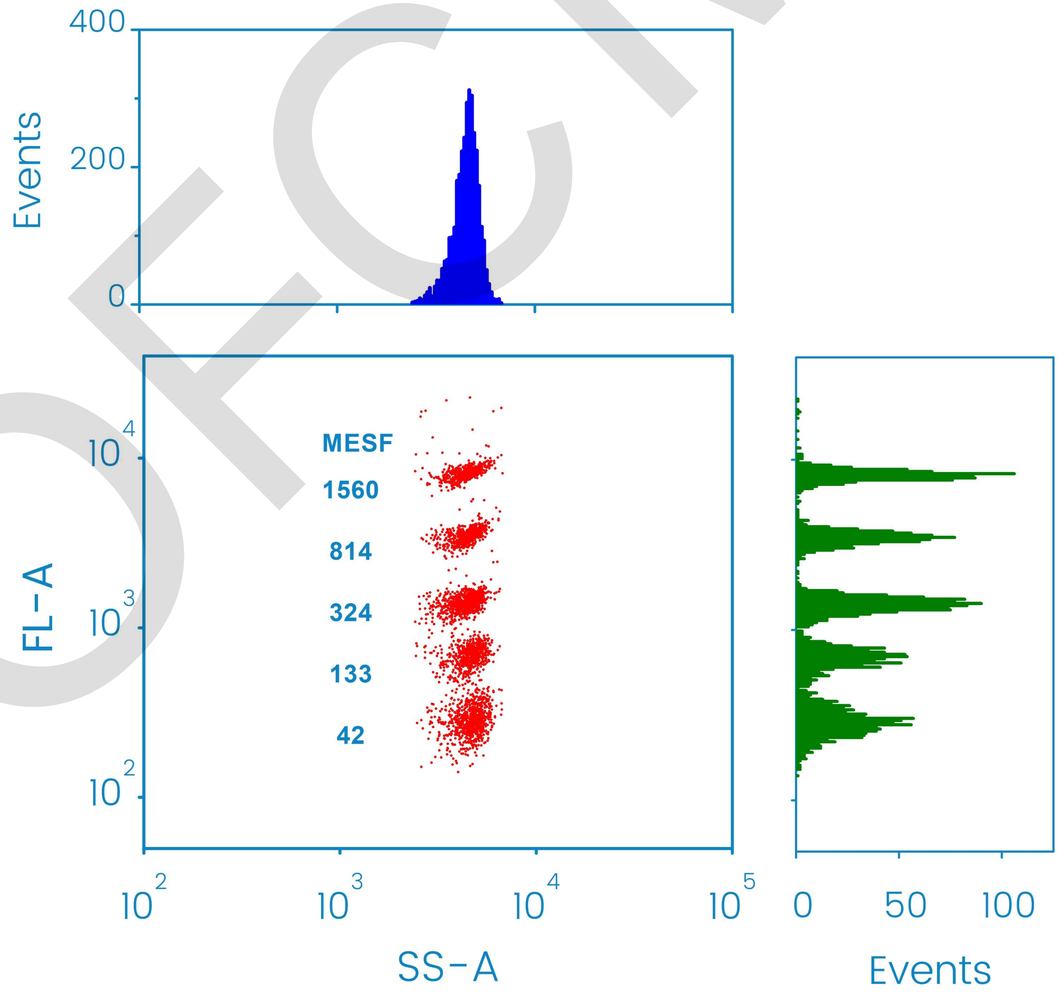


Sensitivity for Fluorescence Detection



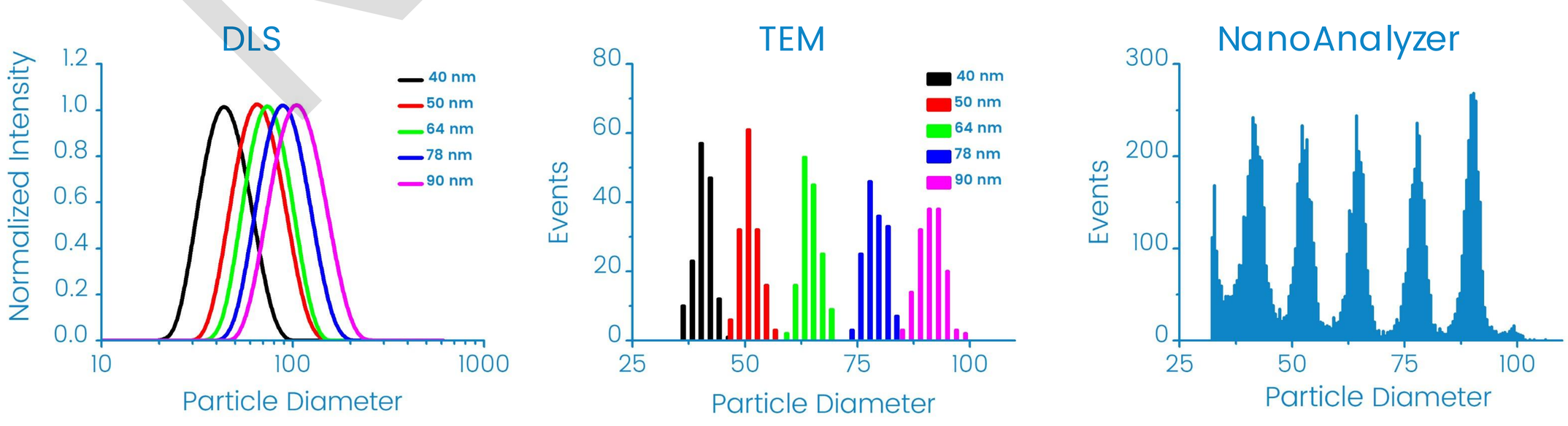
Resolution for Fluorescence Detection

Mixture of 212 nm Fluorescent Silica NPs



Resolution Comparable to Electron Microscopy

Mixture of 40, 50, 64, 78 and 90 nm Silica Nanoparticles

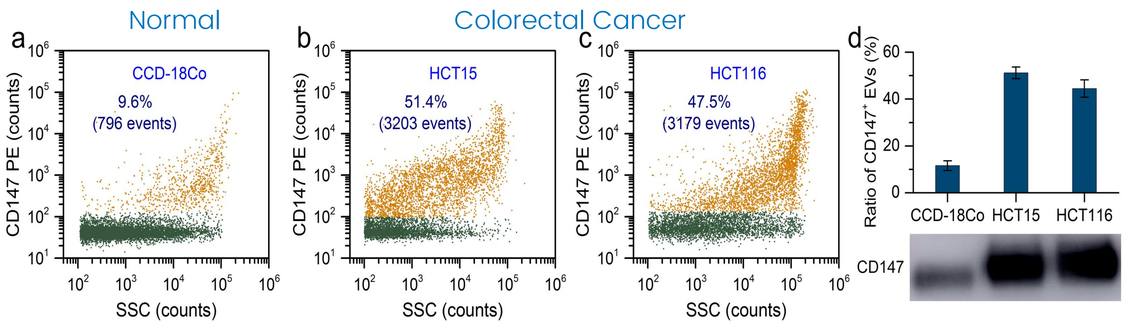


Unmatched Performance • Superior Sensitivity • Innovation for NanoWorld

Application of Extracellular Vesicles

Early Diagnosis of Cancer

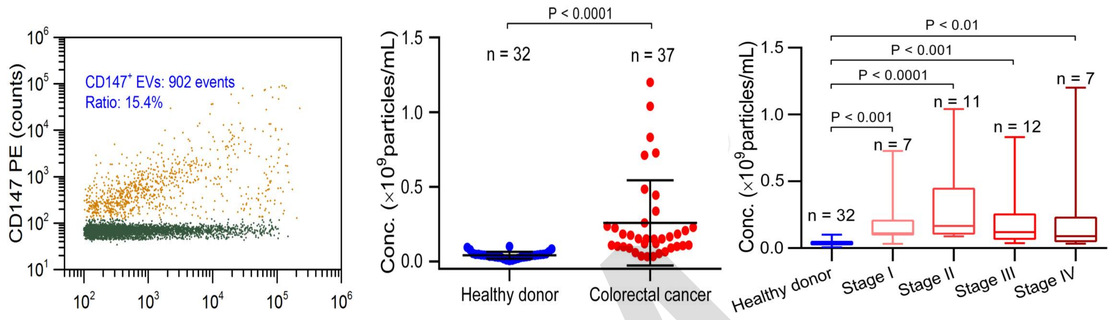
CD147+ EVs in Colorectal Cancer Cell Lines



CD147 expression is analyzed quantitatively at single EV level by NanoFCM. Moreover, NanoFCM allows correlating the protein abundance with vesicle size at the single-particle level, CD147-positive EVs exhibit a range of sizes depending on their cell origin.

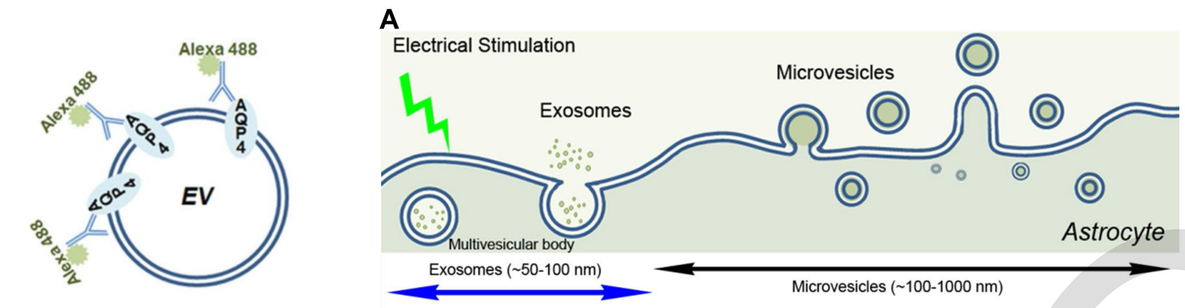
ACS Nano 2018, 12, 671-680

CD147+ EVs in Clinical Blood Samples



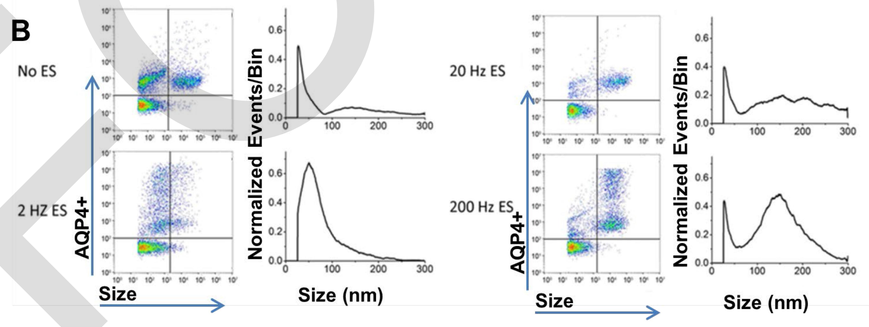
NanoFCM is able to identify the elevated level of CD147 positive EVs for patients at all the cancer stages, even stage I. Moreover, this strategy can be used to track the level of CD147 expression after surgical resection.

Programmable Modulation for EVs



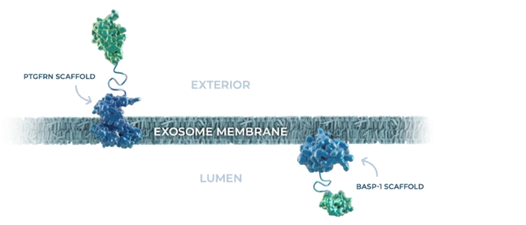
DOI: http://dx.doi.org/10.1101/566448

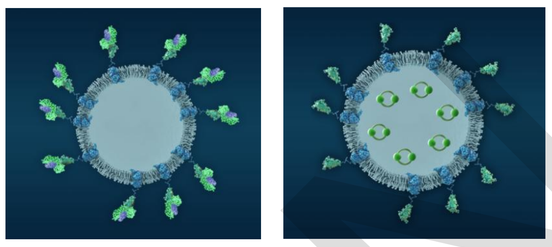
Distributions of EVs after Electrical Stimulation



Identification of A Versatile Platform

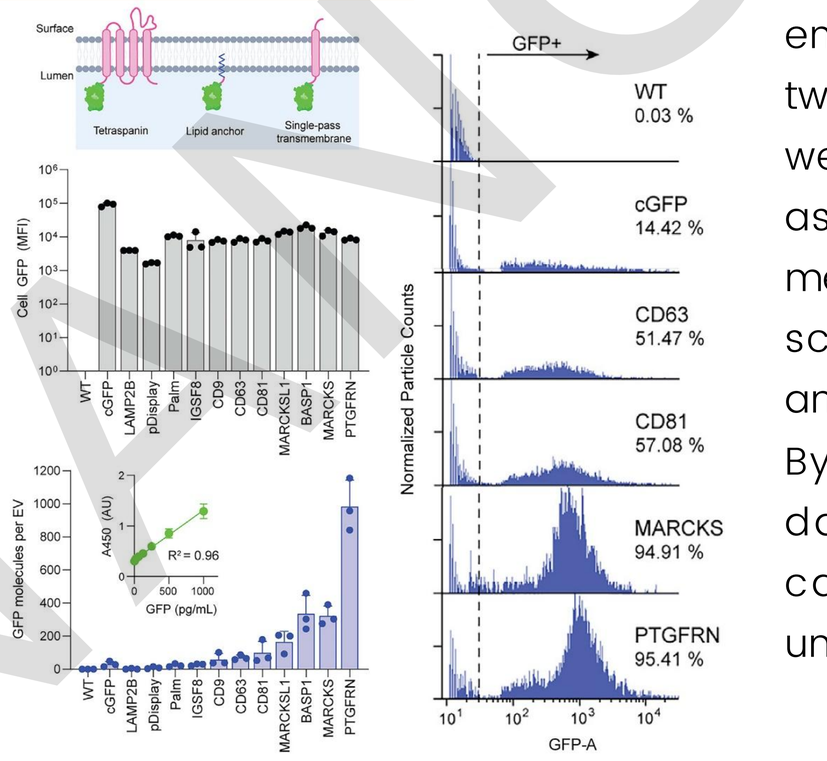
engEx™ Platform





exoIL-12

exoSTING

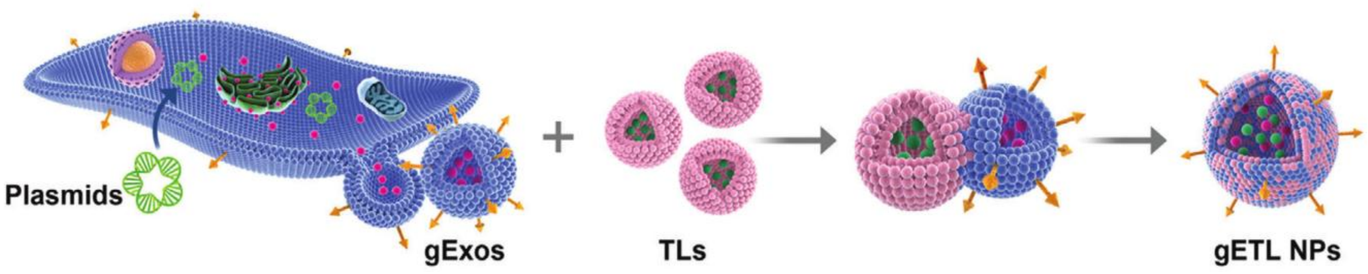


engEx™ Platform is based on the discovery of two scaffold proteins. Flow cytometry and ELISA were used to measure cellular and exosome-associated protein expression, however, these methods fail to determine whether overexpressed scaffold proteins were uniformly distributed among EVs or enriched in subsets.

By analyzing EVs at single particle level, the data suggest that overexpression of the candidate scaffolds results in abundant, uniform distribution across EVs.

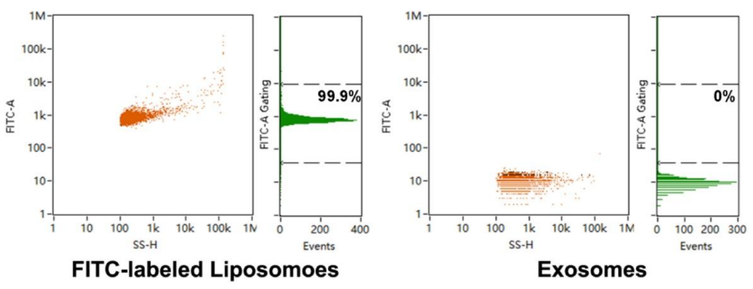
Mol Ther. 2021 May 5; 29(5):1729-1743

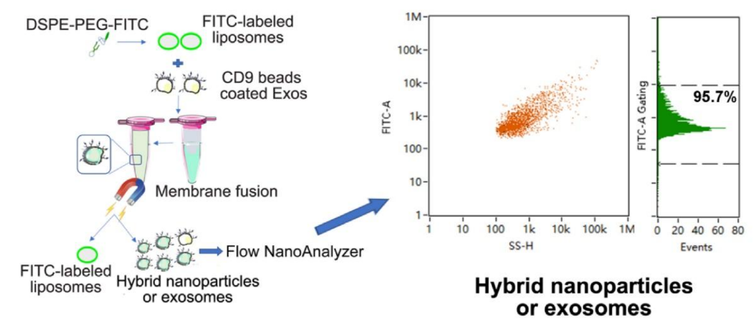
Exosome-Liposome Hybrid Nanoparticles



Thermosensitive liposomes were fused with genetically engineered exosomes, the resulting exosome-liposome hybrid NPs display CD47 on the surface and bear thermosensitive agents inside. NanoFCM allows the analysis of liposomes and exosomes at single particle level, and the fusion efficiency is also determined.

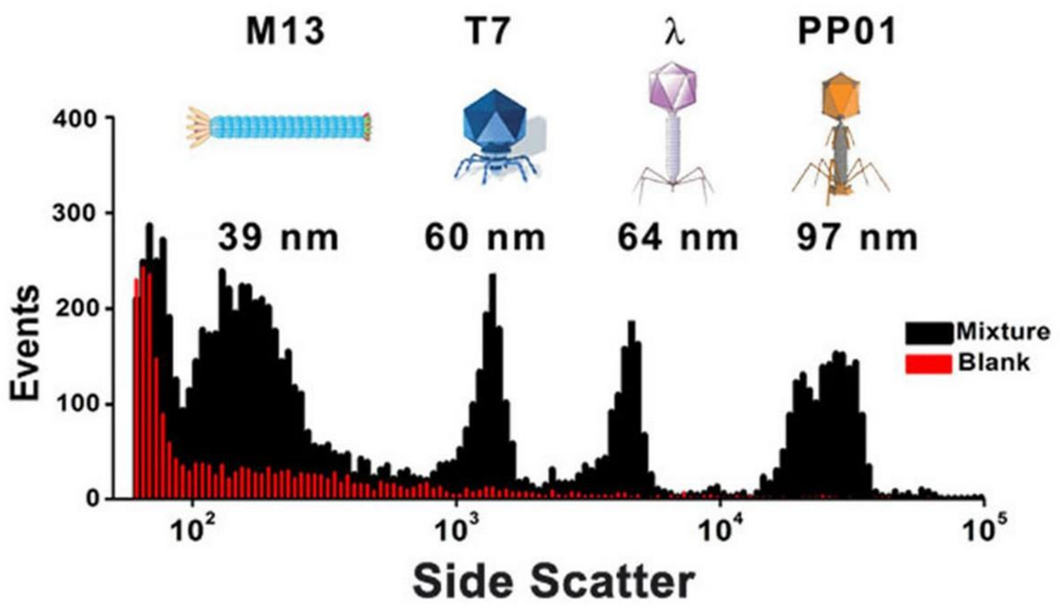
Adv. Sci. 2020, 7, 2000515



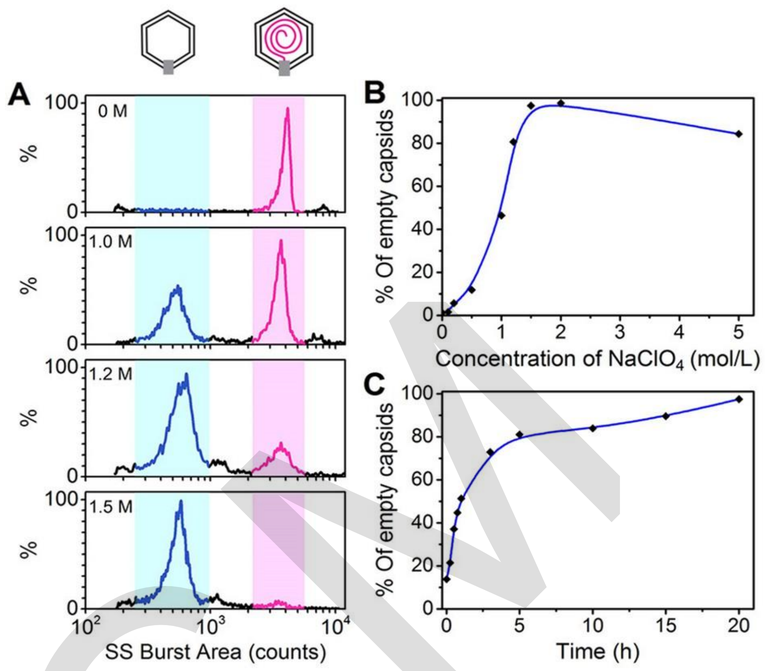


Application of Viruses

Size Differentiation of A Virus Mixture

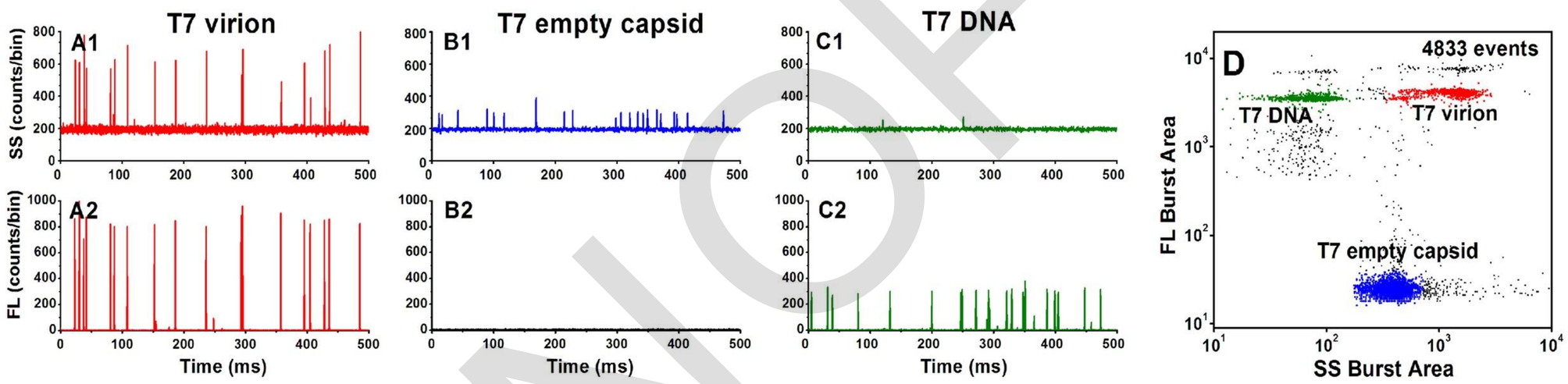


Dynamic Monitoring of Viral DNA Release



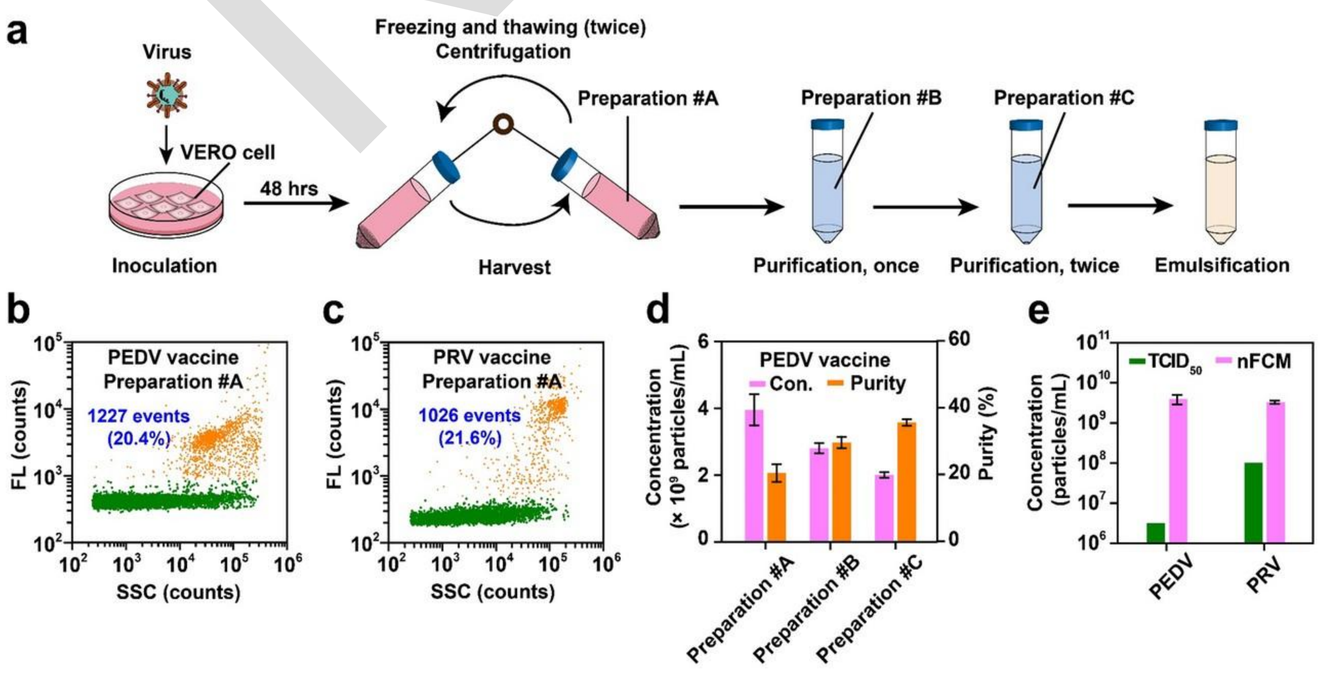
Angew. Chem. Int. Ed. 2016, 55, 10239-10243

Virus-Mediated Drug Delivery Vectors



Viruses can be considered as nature's nanotechnology, serving as nanoscale vehicles for the delivery of nucleic-acid cargos into host cells. Through nucleic acid staining, nano-flow cytometry is able to discriminate individual virions from empty viral capsid and free viral DNA, which is helpful to determine the drug loading efficiency, the loading content, and the effective ratio.

Characterisation of Virus-Based Vaccines



The main steps of producing virus-based vaccines include virus inoculation, harvest, purification, and emulsification. Through nucleic acid staining, NanoFCM allows the fast evaluation of virus products at different steps. With further purification upon precipitation, the concentration of intact viruses decreases, while the purity increases.

Angew. Chem. Int. Ed. 2021, 60, 9351-9356

Technical Specifications

NanoAnalyzer	Model Number	N30E		U30	
Detectors	Laser	488 nm	528 nm	488 & 638 nm	528 & 638 nm
	SSC	SPCM	SPCM	SPCM	SPCM
	525/40 nm	SPCM	——	SPCM	——
	580/40 nm	——	SPCM	——	SPCM
	>650 nm	SPCM	SPCM	SPCM	SPCM
	SPCM: Single Photon Counting Module;				
Optics	Laser Configuration	6 μm × 24 μm elliptical spot			
	Flow Cell	250 × 250 μm rectangular quartz flow cell			
	SSC Sensitivity	< 30 nm			
	SSC Resolution	40/50 nm			
	Particle Size	7 - 1000 nm			
	Fluorescence Sensitivity	AF488 <10, PE< 1			
	Fluorescence Resolution	42/133 ERF			
	Filters	User Exchangeable			
Fluidics	Sample Acquisition Rate	10,000 events/min			
	Sample Flow Rate	2 - 60 nL/min			
	Sheath Flow Rate	10 - 40 μL/min			
	Sample Volume	10 - 100 μL			
	Fluid Container Capacity	1 L sheath, 1 L waste, 50 mL cleaning			
	Fluidics Maintenance	Automated startup, cleaning, decontamination and shutdown			
Data Processing	Parameters	Peak Height, Area and Width for all Channels			
	Output Data Files	NFA; FCS 3.0			
	Software	NF Profession 3.0			
Sampling	Manual Sample Loading	0.6 mL EP tube			
Operating Conditions	Instrument Dimension (W × D × H)	50.6 cm × 34.6 cm× 29.0 cm 19.9 in × 13.6 in × 11.4 in			
	Instrument Weight	51.6 lb (23.4 kg)			
	Power Requirements	110-240 VAC, 50-60 Hz			
	Environment Requirements	Temperature: 15-35˚C; Relative Humidity: 80% maximum			

Learn more about us, visit www.nanofcm.com or email info@nanofcm.com

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