Supplementary Materials: The Dispersion State of Tangled Multi-Walled Carbon Nanotubes Affects Their Cytotoxicity

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Table S1. The size of FT9110 sonicated by PR-1.

	Z-average (d, nm)	
	FBS	**PS**
5 h	290 ± 2	104 ± 0
1 week	210 ± 4	122 ± 1

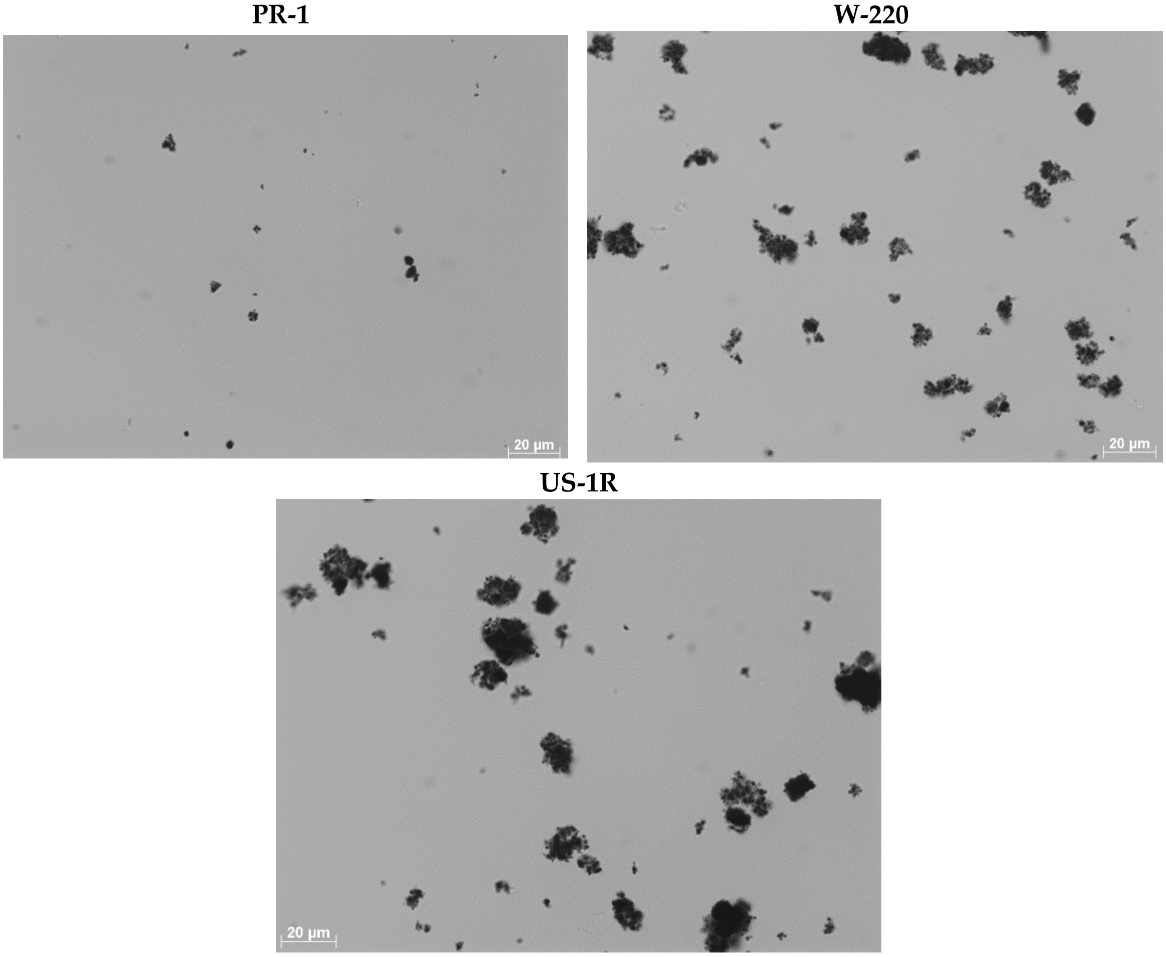


Figure S1. Light microscopic view of dispersed FT9110:FT9110 dispersed in PS by each sonicator were added to culture medium at 1/100 volume on Cell view glass bottom advanced TC 4 compartments. After 1 h, a light microscopic view was obtained using an AxioObserverZ1 fluorescence microscope.

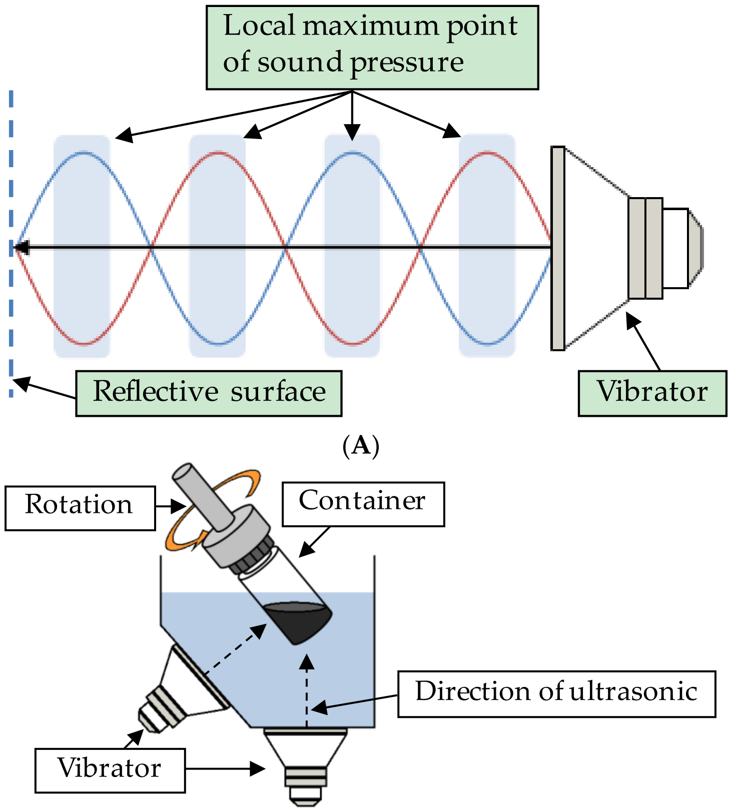
Table S2. Properties of FT 9110.

Properties	Units	Values
Average diameter	nm	10–15
Length	mm	10
Purity	%	≥99.8
Non-carbon content	%	≤0.2
Fe elemental content	ppm	>100
Surface area (BET)	M2/g	160–230
Tap density	g/cm2	0.1–0.2

Figure S2. FT 9110.

Table S3. Sonicator information.

Property	PR-1	US-1R	W-220
Picture			
Manufacturer	Thinky (Tokyo, Japan)	As one (Tokyo, Japan)	Heat systems-ultrasonic (Plainwiew, NY, USA)
Output power	140 W	55 W	140 W
Sonicator type	Water bath	Water bath	Prove



(**A**)

(**B**)

Figure S3. PR-1 Nano Premixer information**:** PR-1 is an ultrasonic sonicator that can stir CNTs and buffer by rotating the container. This structure enables uniform ultrasonic irradiation of samples and suppresses the uneven dispersion caused by standing waves (**A**); the two vibrators located on the bottom and the side enhance dispersion efficiency by concentrating the ultrasonic radiation (**B**). The PR-1 has more than double the ultrasonic output power of conventional sonicators, even though it is smaller than conventional sonicators; it is also easy to use because it uses an ultrasonic bath system. This mechanism and structure increase the watt density and improve the dispersion performance.

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