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Supporting information
for
Self-assembled chitosan-PEG nanocarriers for *Cordyceps militaris* extract: process optimization and enhanced biological activities

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HORIBA Scientific

HORIBA SZ-100 for Windows [Z Type] Ver2.20

SZ-100

5-5.nsz

Measurement Results

Date	: Monday, June 27, 2022 10:17:33
Measurement Type	: Particle Size
Sample Name	: 5:5
Scattering Angle	: 90
Temperature of the Holder	: 24.8 °C
Dispersion Medium Viscosity	: 0.898 mPa·s
Transmission Intensity before Meas.	: 31387
Distribution Form	: Standard
Distribution Form(Dispersity)	: Monodisperse
Representation of Result	: Scattering Light Intensity
Count Rate	: 4919 kCPS

Calculation Results

Peak No.	S.P.Area Ratio	Mean	S. D.	Mode
1	1.00	149.5 nm	98.8 nm	142.5 nm
2	---	--- nm	--- nm	--- nm
3	---	--- nm	--- nm	--- nm
Total	1.00	149.5 nm	98.8 nm	142.5 nm

Cumulant Operations

Z-Average	: 927.9 nm
PI	: 0.547

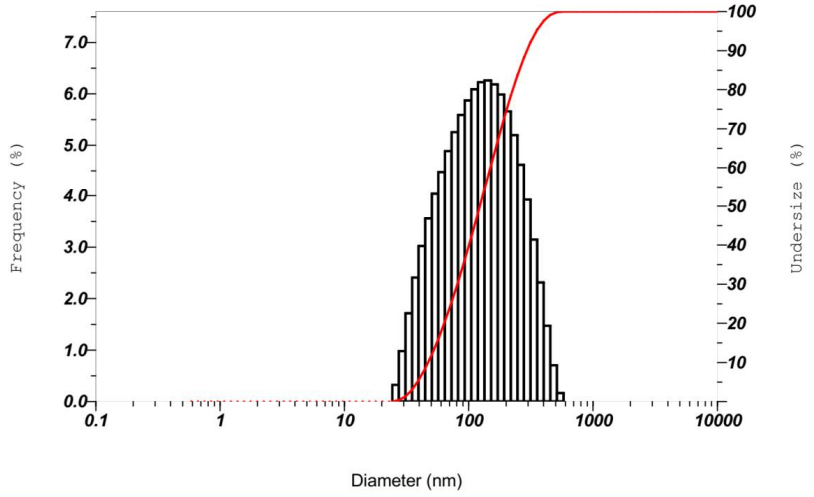

Figure S1. Size distribution of at Cts:PEG 5:5.

2022.06.27 10:37:42

HORIBA Scientific

HORIBA SZ-100 for Windows [Z Type] Ver2.20

SZ-100

7-3.nsz

Measurement Results

Date	: Monday, June 27, 2022 10:35:44
Measurement Type	: Particle Size
Sample Name	: 7:3
Scattering Angle	: 90
Temperature of the Holder	: 24.9 °C
Dispersion Medium Viscosity	: 0.897 mPa·s
Transmission Intensity before Meas.	: 33269
Distribution Form	: Standard
Distribution Form(Dispersity)	: Monodisperse
Representation of Result	: Scattering Light Intensity
Count Rate	: 3705 kCPS

Calculation Results

Peak No.	S.P.Area Ratio	Mean	S. D.	Mode
1	1.00	20.1 nm	14.1 nm	12.4 nm
2	---	--- nm	--- nm	--- nm
3	---	--- nm	--- nm	--- nm
Total	1.00	20.1 nm	14.1 nm	12.4 nm

Cumulant Operations

Z-Average	: 14.1 nm
PI	: 0.366

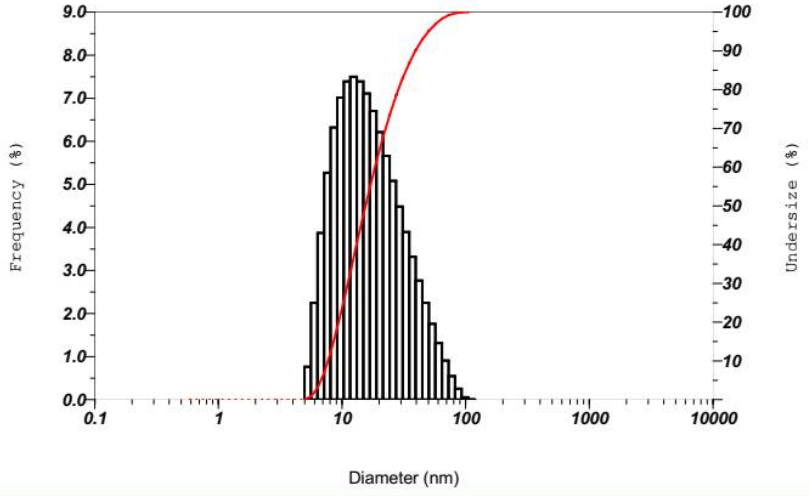

Figure S2. Size distribution at Cts:PEG 7:3.

2022.06.27 10:58:37

HORIBA Scientific

HORIBA SZ-100 for Windows [Z Type] Ver2.20

SZ-100

9-1.nsz

Measurement Results

Date	:	Monday, June 27, 2022 10:42:57
Measurement Type	:	Particle Size
Sample Name	:	9:1
Scattering Angle	:	90
Temperature of the Holder	:	24.9 °C
Dispersion Medium Viscosity	:	0.897 mPa·s
Transmission Intensity before Meas.	:	31112
Distribution Form	:	Standard
Distribution Form(Dispersity)	:	Monodisperse
Representation of Result	:	Scattering Light Intensity
Count Rate	:	1472 kCPS

Calculation Results

Peak No.	S.P.Area Ratio	Mean	S. D.	Mode
1	1.00	271.2 nm	133.2 nm	205.9 nm
2	---	--- nm	--- nm	--- nm
3	---	--- nm	--- nm	--- nm
Total	1.00	271.2 nm	133.2 nm	205.9 nm

Cumulant Operations

Z-Average	:	384.1 nm
PI	:	0.449

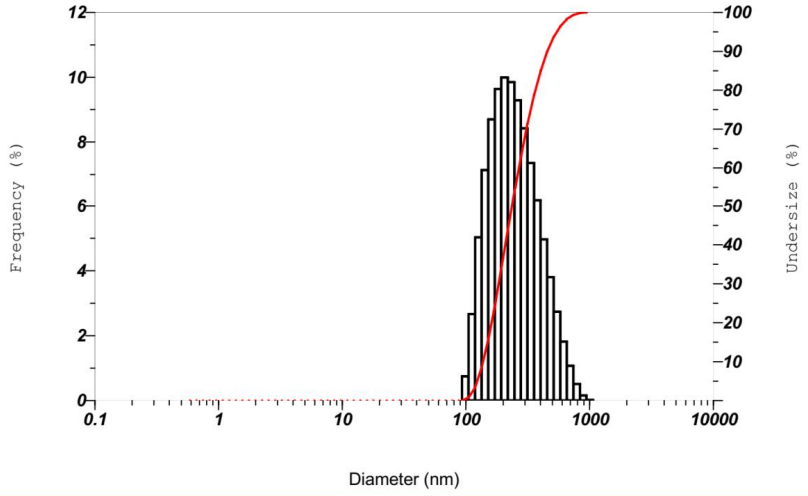

Figure S3. Size distribution of at Cts:PEG 9:1.

HORIBA Scientific

HORIBA SZ-100 for Windows [Z Type] Ver2.20

SZ-100

1%.nsz

Measurement Results

Date	:	Friday, July 1, 2022 14:59:38 PM
Measurement Type	:	Particle Size
Sample Name	:	1%
Scattering Angle	:	90
Temperature of the Holder	:	25.0 °C
Dispersion Medium Viscosity	:	0.896 mPa·s
Transmission Intensity before Meas.	:	31158
Distribution Form	:	Standard
Distribution Form(Dispersity)	:	Monodisperse
Representation of Result	:	Scattering Light Intensity
Count Rate	:	2210 kCPS

Calculation Results

Peak No.	S.P.Area Ratio	Mean	S. D.	Mode
1	0.17	1.1 nm	0.1 nm	1.1 nm
2	0.83	57.9 nm	8.3 nm	55.0 nm
3	---	--- nm	--- nm	--- nm
Total	1.00	48.2 nm	22.6 nm	55.0 nm

Cumulant Operations

Z-Average : 6748.9 nm

PI : 2.024

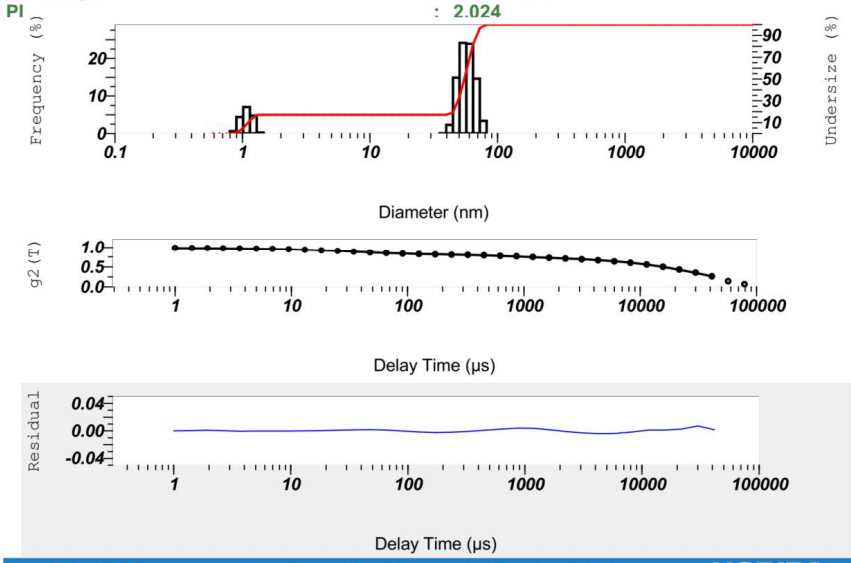

Figure S4. Size distribution of at 1.0% Tween 80.

HORIBA Scientific

HORIBA SZ-100 for Windows [Z Type] Ver2.20

SZ-100

7-3.nsz

Measurement Results

Date	:	Monday, June 27, 2022 10:35:44
Measurement Type	:	Particle Size
Sample Name	:	7:3
Scattering Angle	:	90
Temperature of the Holder	:	24.9 °C
Dispersion Medium Viscosity	:	0.897 mPa·s
Transmission Intensity before Meas.	:	33269
Distribution Form	:	Standard
Distribution Form(Dispersity)	:	Monodisperse
Representation of Result	:	Scattering Light Intensity
Count Rate	:	3705 kCPS

Calculation Results

Peak No.	S.P.Area Ratio	Mean	S. D.	Mode
1	1.00	20.1 nm	14.1 nm	12.4 nm
2	---	--- nm	--- nm	--- nm
3	---	--- nm	--- nm	--- nm
Total	1.00	20.1 nm	14.1 nm	12.4 nm

Cumulant Operations

Z-Average	:	14.1 nm
PI	:	0.366

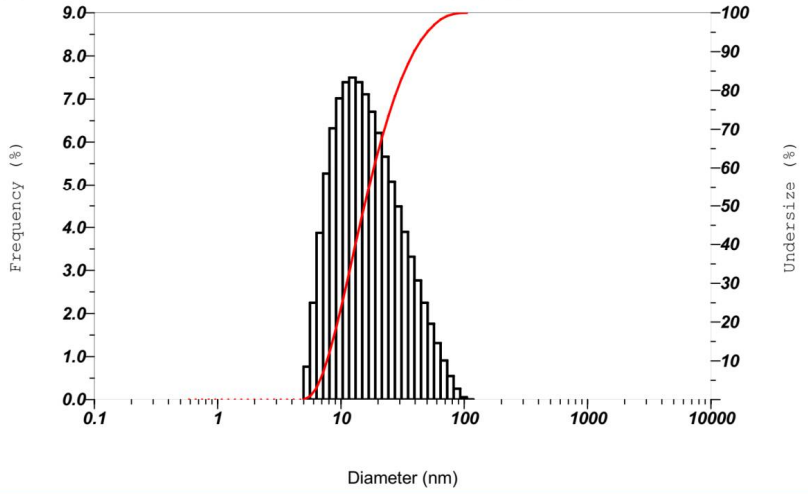

Figure S5. Size distribution of at 3.0% Tween 80.

2022.07.01 15:10:43

HORIBA Scientific

HORIBA SZ-100 for Windows [Z Type] Ver2.20

SZ-100

5%.nsz

Measurement Results

Date	:	Friday, July 1, 2022 15:09:11 PM
Measurement Type	:	Particle Size
Sample Name	:	5%
Scattering Angle	:	90
Temperature of the Holder	:	24.9 °C
Dispersion Medium Viscosity	:	0.897 mPa·s
Transmission Intensity before Meas.	:	31377
Distribution Form	:	Standard
Distribution Form(Dispersity)	:	Monodisperse
Representation of Result	:	Scattering Light Intensity
Count Rate	:	1253 kCPS

Calculation Results

Peak No.	S.P.Area Ratio	Mean	S. D.	Mode
1	1.00	17.9 nm	10.7 nm	12.4 nm
2	---	--- nm	--- nm	--- nm
3	---	--- nm	--- nm	--- nm
Total	1.00	17.9 nm	10.7 nm	12.4 nm

Cumulant Operations

Z-Average	:	14.0 nm
PI	:	0.308

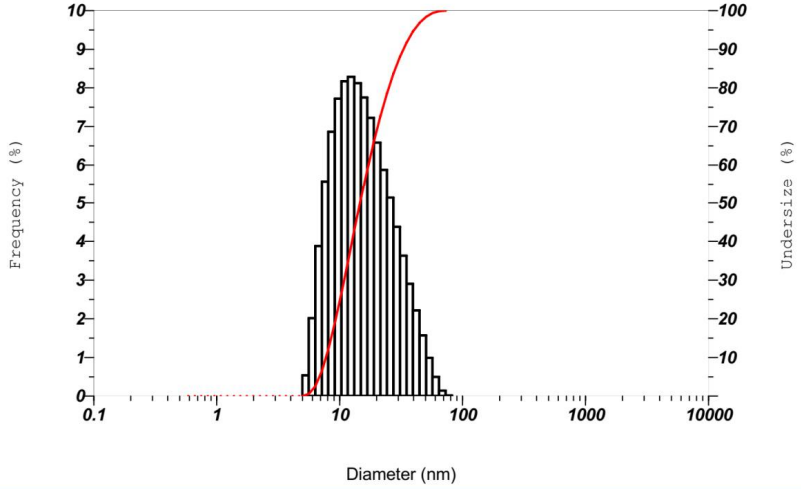

Figure S6. Size distribution of at 5.0% Tween 80.

2022.07.01 15:21:57

HORIBA Scientific

HORIBA SZ-100 for Windows [Z Type] Ver2.20

SZ-100

7%.nsz

Measurement Results

Date	:	Friday, July 1, 2022 14:55:14 PM
Measurement Type	:	Particle Size
Sample Name	:	7%
Scattering Angle	:	90
Temperature of the Holder	:	25.0 °C
Dispersion Medium Viscosity	:	0.895 mPa·s
Transmission Intensity before Meas.	:	30703
Distribution Form	:	Standard
Distribution Form(Dispersity)	:	Monodisperse
Representation of Result	:	Scattering Light Intensity
Count Rate	:	3267 kCPS

Calculation Results

Peak No.	S.P.Area Ratio	Mean	S. D.	Mode
1	1.00	9.9 nm	4.9 nm	7.6 nm
2	---	--- nm	--- nm	--- nm
3	---	--- nm	--- nm	--- nm
Total	1.00	9.9 nm	4.9 nm	7.6 nm

Cumulant Operations

Z-Average	:	9.0 nm
PI	:	0.045

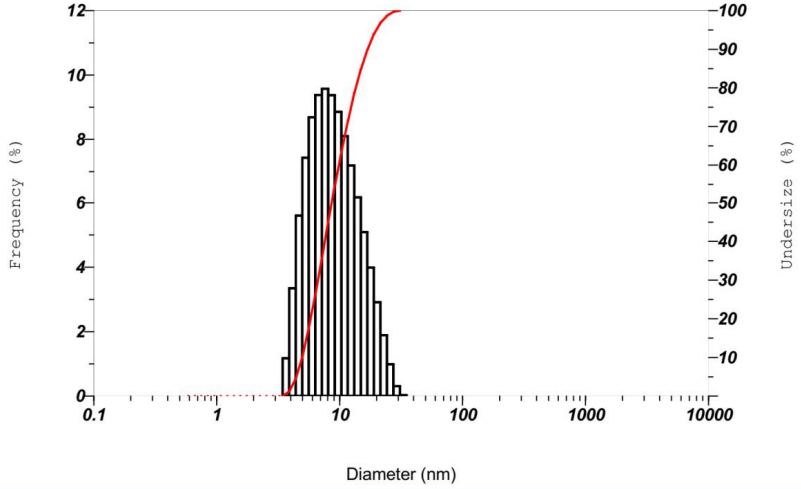

Figure S7. Size distribution of at 7.0% Tween 80.

HORIBA Scientific

HORIBA SZ-100 for Windows [Z Type] Ver2.20

SZ-100

20p.nsz

Measurement Results

Date	:	Monday, July 4, 2022 15:43:53 PM
Measurement Type	:	Particle Size
Sample Name	:	20p
Scattering Angle	:	90
Temperature of the Holder	:	25.0 °C
Dispersion Medium Viscosity	:	0.896 mPa·s
Transmission Intensity before Meas.	:	30915
Distribution Form	:	Standard
Distribution Form(Dispersity)	:	Monodisperse
Representation of Result	:	Scattering Light Intensity
Count Rate	:	1235 kCPS

Calculation Results

Peak No.	S.P.Area Ratio	Mean	S. D.	Mode
1	1.00	11.8 nm	5.1 nm	9.7 nm
2	---	--- nm	--- nm	--- nm
3	---	--- nm	--- nm	--- nm
Total	1.00	11.8 nm	5.1 nm	9.7 nm

Cumulant Operations

Z-Average : 100.9 nm

PI : 0.540

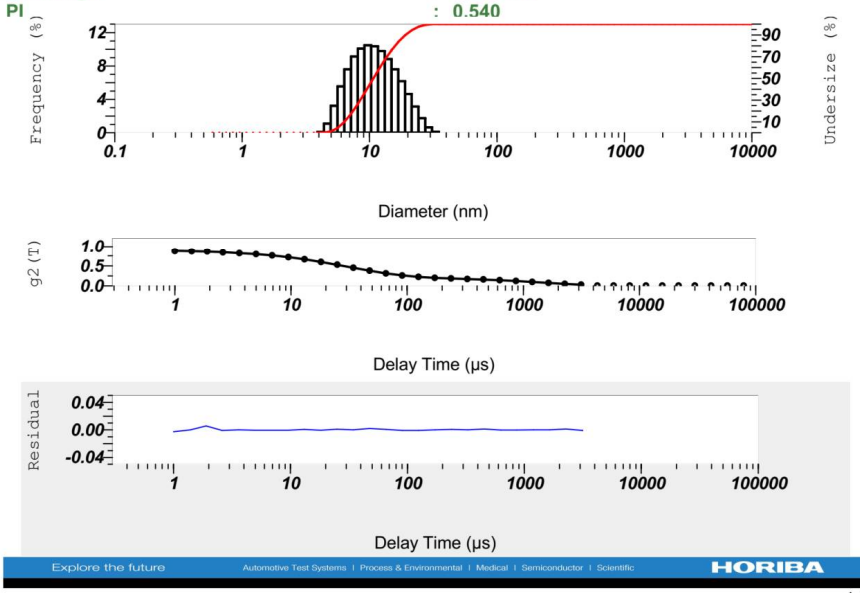

Figure S8. Size distribution of NCCs at of 20 min of stirring.

HORIBA Scientific

HORIBA SZ-100 for Windows [Z Type] Ver2.20

SZ-100

B.nsz

Measurement Results

Date	:	Monday, July 25, 2022 17:14:46
Measurement Type	:	Particle Size
Sample Name	:	B
Scattering Angle	:	90
Temperature of the Holder	:	25.0 °C
Dispersion Medium Viscosity	:	0.896 mPa·s
Transmission Intensity before Meas.	:	33411
Distribution Form	:	Standard
Distribution Form(Dispersity)	:	Polydisperse
Representation of Result	:	Scattering Light Intensity
Count Rate	:	1206 kCPS

Calculation Results

Peak No.	S.P.Area Ratio	Mean	S. D.	Mode
1	1.00	14.4 nm	6.3 nm	12.4 nm
2	---	--- nm	--- nm	--- nm
3	---	--- nm	--- nm	--- nm
Total	1.00	14.4 nm	6.3 nm	12.4 nm

Cumulant Operations

Z-Average	:	12.2 nm
PI	:	0.267

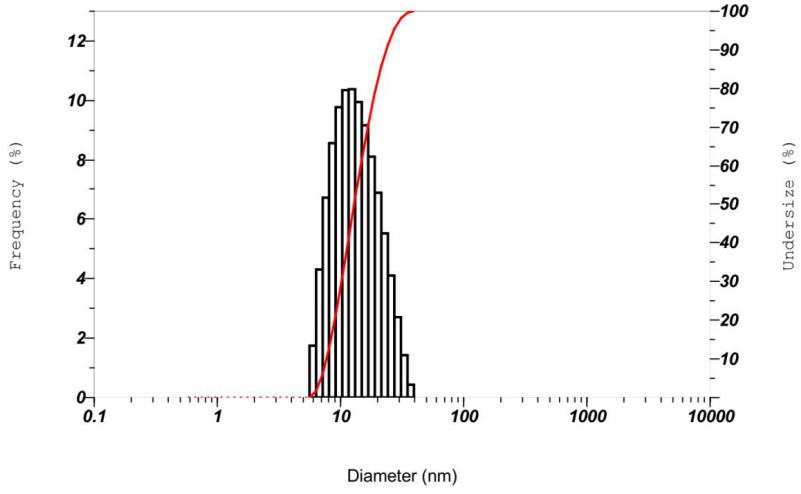

Figure S9. Size distribution of NCCs at of 30 min of stirring.

HORIBA Scientific

HORIBA SZ-100 for Windows [Z Type] Ver2.20

SZ-100

40p.nsz

Measurement Results

Date	: Monday, July 4, 2022 15:35:58 PM
Measurement Type	: Particle Size
Sample Name	: 40p
Scattering Angle	: 90
Temperature of the Holder	: 24.9 °C
Dispersion Medium Viscosity	: 0.897 mPa·s
Transmission Intensity before Meas.	: 29988
Distribution Form	: Standard
Distribution Form(Dispersity)	: Monodisperse
Representation of Result	: Scattering Light Intensity
Count Rate	: 1257 kCPS

Calculation Results

Peak No.	S.P.Area Ratio	Mean	S. D.	Mode
1	1.00	17.6 nm	10.7 nm	12.4 nm
2	---	--- nm	--- nm	--- nm
3	---	--- nm	--- nm	--- nm
Total	1.00	17.6 nm	10.7 nm	12.4 nm

Cumulant Operations

Z-Average	: 13.1 nm
PI	: 0.500

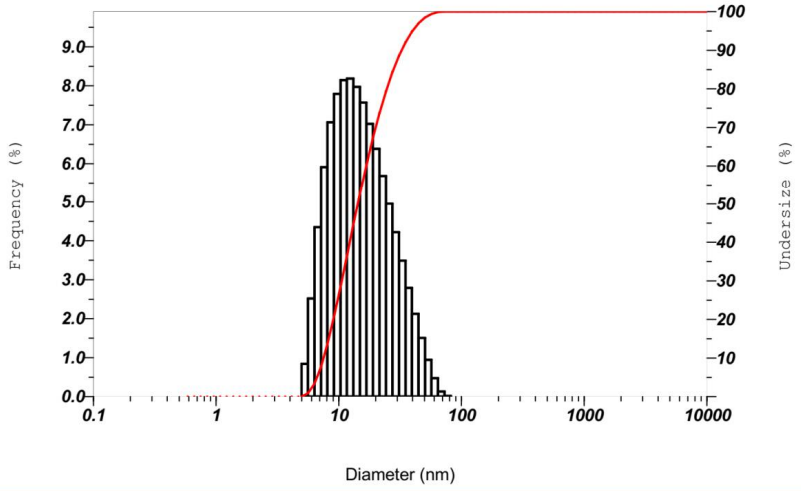

Figure S10. Size distribution of NCCs at of 40 min of stirring.

HORIBA Scientific

HORIBA SZ-100 for Windows [Z Type] Ver2.20

SZ-100

600V.nsz

Measurement Results

Date	:	Tuesday, July 5, 2022 16:56:27 PM
Measurement Type	:	Particle Size
Sample Name	:	600V
Scattering Angle	:	90
Temperature of the Holder	:	25.0 °C
Dispersion Medium Viscosity	:	0.896 mPa·s
Transmission Intensity before Meas.	:	31442
Distribution Form	:	Broad
Distribution Form(Dispersity)	:	Polydisperse
Representation of Result	:	Scattering Light Intensity
Count Rate	:	1943 kCPS

Calculation Results

Peak No.	S.P.Area Ratio	Mean	S. D.	Mode
1	1.00	10.7 nm	2.8 nm	10.9 nm
2	---	--- nm	--- nm	--- nm
3	---	--- nm	--- nm	--- nm
Total	1.00	10.7 nm	2.8 nm	10.9 nm

Cumulant Operations

Z-Average : 222.2 nm

PI : 0.663

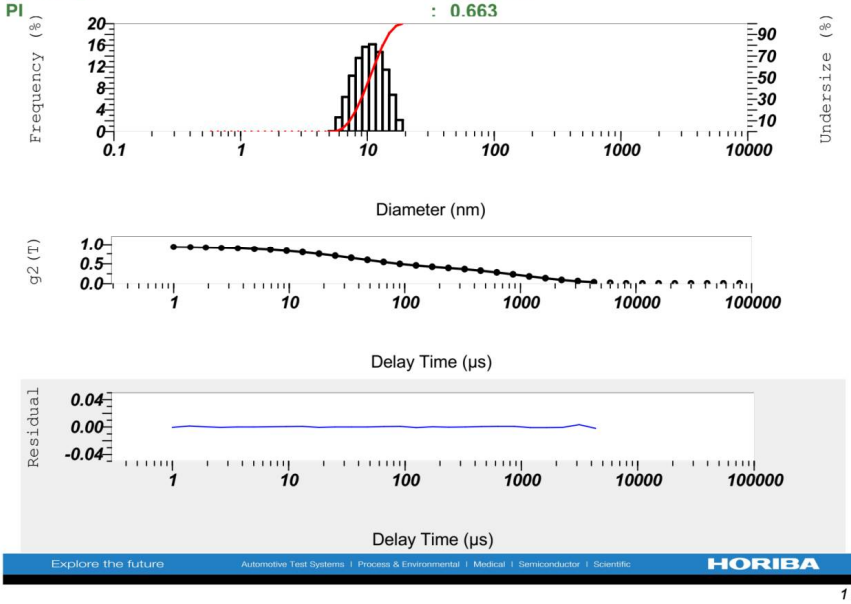

Figure S11. Size distribution of NCCs at 600 rpm.

2022.07.12 15:42:47

HORIBA Scientific

HORIBA SZ-100 for Windows [Z Type] Ver2.20

SZ-100

15%.nsz

Measurement Results

Date	:	Tuesday, July 12, 2022 15:25:21 PM
Measurement Type	:	Particle Size
Sample Name	:	15%
Scattering Angle	:	90
Temperature of the Holder	:	25.0 °C
Dispersion Medium Viscosity	:	0.895 mPa·s
Transmission Intensity before Meas.	:	32232
Distribution Form	:	Standard
Distribution Form(Dispersity)	:	Monodisperse
Representation of Result	:	Scattering Light Intensity
Count Rate	:	3809 kCPS

Calculation Results

Peak No.	S.P.Area Ratio	Mean	S. D.	Mode
1	1.00	15.4 nm	8.1 nm	11.0 nm
2	---	--- nm	--- nm	--- nm
3	---	--- nm	--- nm	--- nm
Total	1.00	15.4 nm	8.1 nm	11.0 nm

Cumulant Operations

Z-Average : 12.4 nm

PI : 0.277

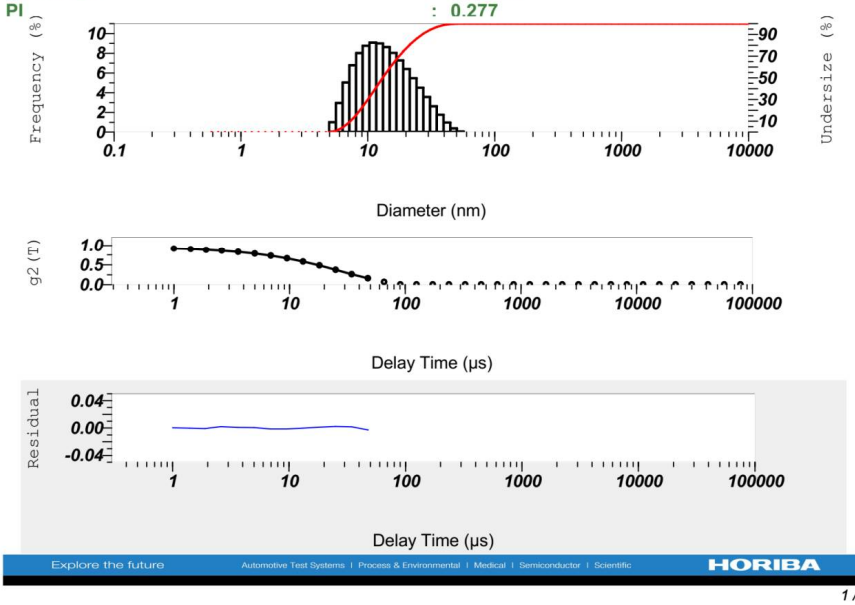

Figure S12. Size distribution of NCCs at 900 rpm.

2022.07.05 17:02:41

HORIBA Scientific

HORIBA SZ-100 for Windows [Z Type] Ver2.20

SZ-100

1200V.nsz

Measurement Results

Date	:	Tuesday, July 5, 2022 16:45:15 PM
Measurement Type	:	Particle Size
Sample Name	:	1200V
Scattering Angle	:	90
Temperature of the Holder	:	24.8 °C
Dispersion Medium Viscosity	:	0.898 mPa·s
Transmission Intensity before Meas.	:	32562
Distribution Form	:	Broad
Distribution Form(Dispersity)	:	Polydisperse
Representation of Result	:	Scattering Light Intensity
Count Rate	:	1367 kCPS

Calculation Results

Peak No.	S.P.Area Ratio	Mean	S. D.	Mode
1	1.00	10.7 nm	1.9 nm	9.9 nm
2	---	--- nm	--- nm	--- nm
3	---	--- nm	--- nm	--- nm
Total	1.00	10.7 nm	1.9 nm	9.9 nm

Cumulant Operations

Z-Average : 20.8 nm

PI : 0.743

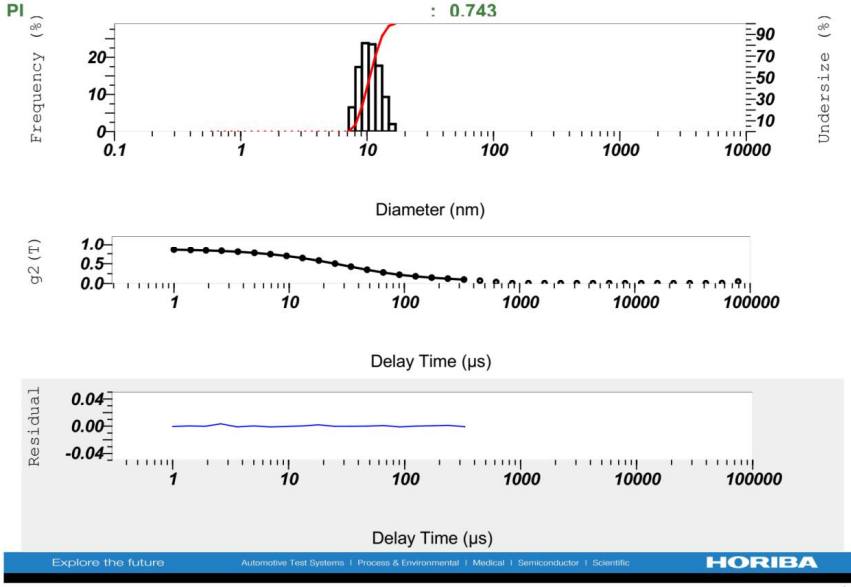

Figure S13. Size distribution of NCCs at 1200 rpm.

HORIBA Scientific

HORIBA SZ-100 for Windows [Z Type] Ver2.20

SZ-100

60oC.nsz

Measurement Results

Date	:	Wednesday, July 6, 2022 15:25:24 PM
Measurement Type	:	Particle Size
Sample Name	:	60oC
Scattering Angle	:	90
Temperature of the Holder	:	25.0 °C
Dispersion Medium Viscosity	:	0.896 mPa·s
Transmission Intensity before Meas.	:	29870
Distribution Form	:	Standard
Distribution Form(Dispersity)	:	Monodisperse
Representation of Result	:	Scattering Light Intensity
Count Rate	:	2906 kCPS

Calculation Results

Peak No.	S.P.Area Ratio	Mean	S. D.	Mode
1	0.88	472.6 nm	246.0 nm	336.1 nm
2	0.12	5587.4 nm	2086.4 nm	8518.3 nm
3	---	--- nm	--- nm	--- nm
Total	1.00	1103.9 nm	1849.5 nm	336.1 nm

Cumulant Operations

Z-Average	:	346.2 nm
PI	:	0.617

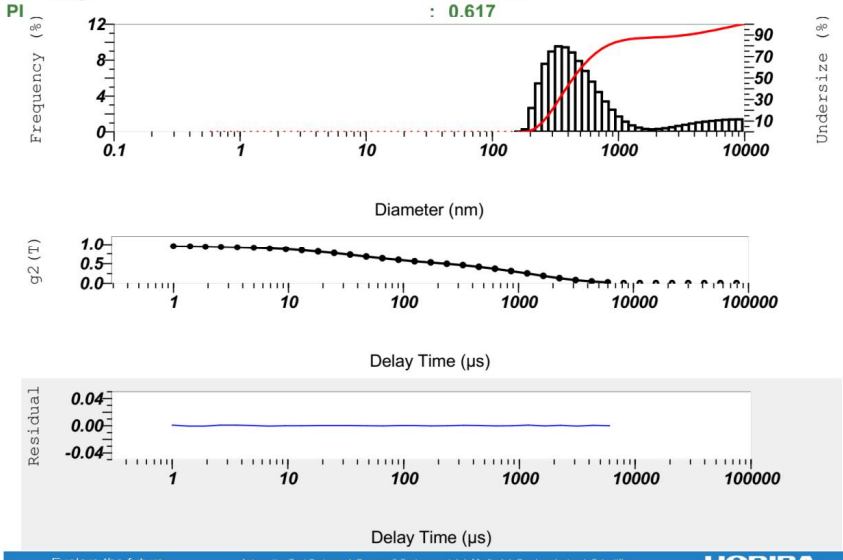

Figure S14. Size distribution of NCCs at 60°C of PIT.

HORIBA Scientific

HORIBA SZ-100 for Windows [Z Type] Ver2.20

SZ-100

A.nsz

Measurement Results

Date	:	Monday, July 25, 2022 17:20:46
Measurement Type	:	Particle Size
Sample Name	:	A
Scattering Angle	:	90
Temperature of the Holder	:	25.0 °C
Dispersion Medium Viscosity	:	0.896 mPa·s
Transmission Intensity before Meas.	:	32546
Distribution Form	:	Standard
Distribution Form(Dispersity)	:	Polydisperse
Representation of Result	:	Scattering Light Intensity
Count Rate	:	3459 kCPS

Calculation Results

Peak No.	S.P.Area Ratio	Mean	S. D.	Mode
1	1.00	11.2 nm	1.6 nm	11.0 nm
2	---	--- nm	--- nm	--- nm
3	---	--- nm	--- nm	--- nm
Total	1.00	11.2 nm	1.6 nm	11.0 nm

Cumulant Operations

Z-Average	:	11.0 nm
PI	:	0.275

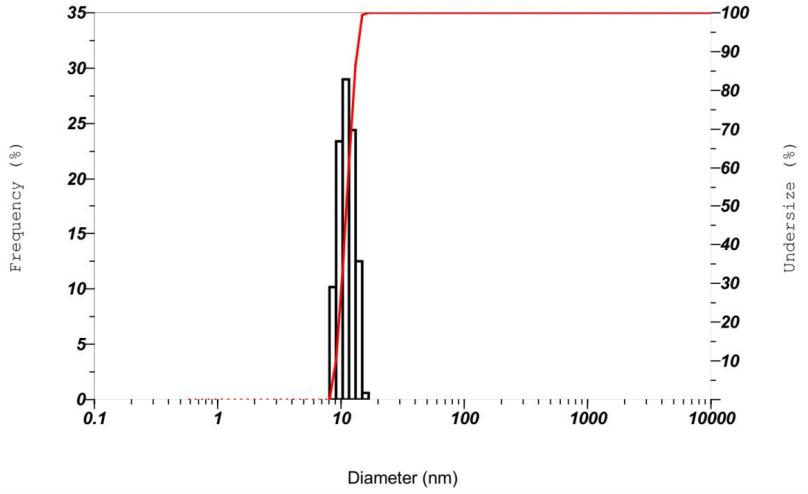

Figure S15. Size distribution of NCCs at 70°C of PIT.

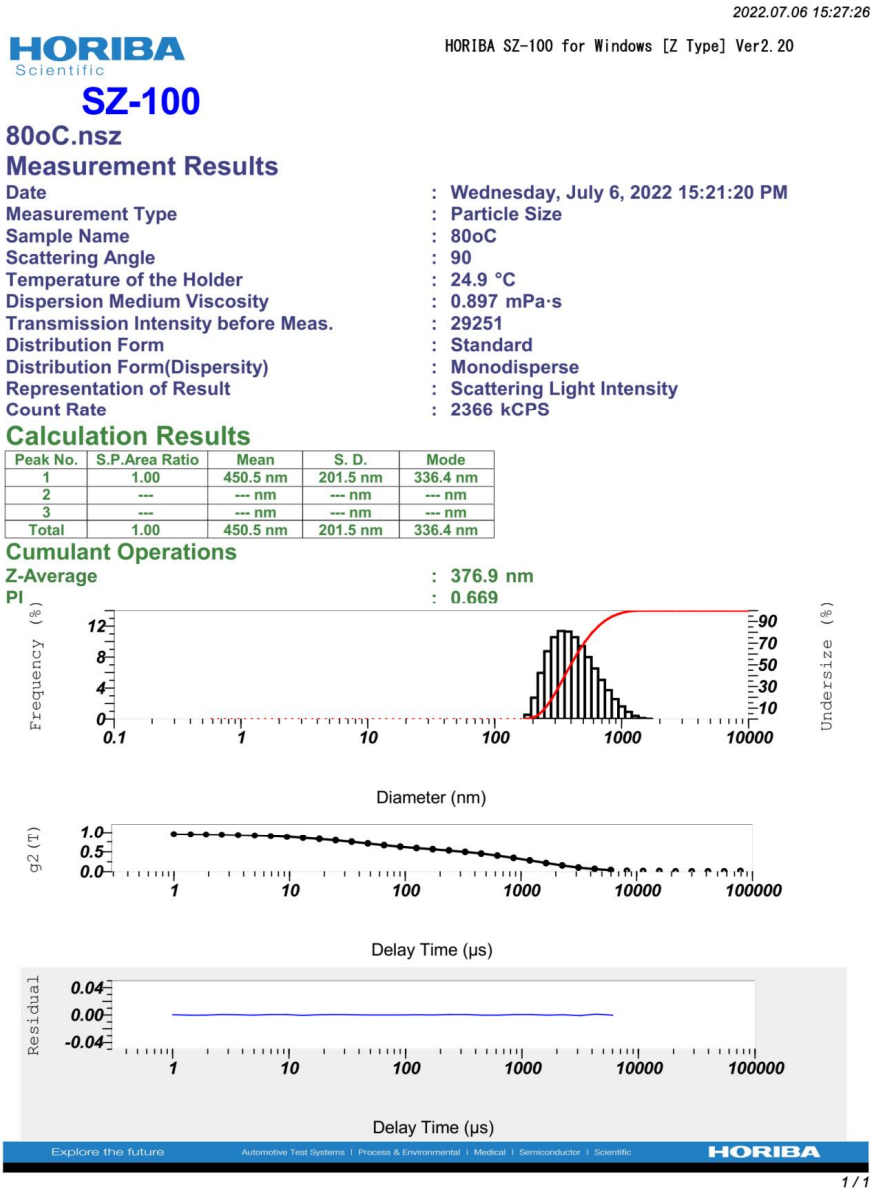

Figure S16. Size distribution of NCCs at 80°C of PIT.

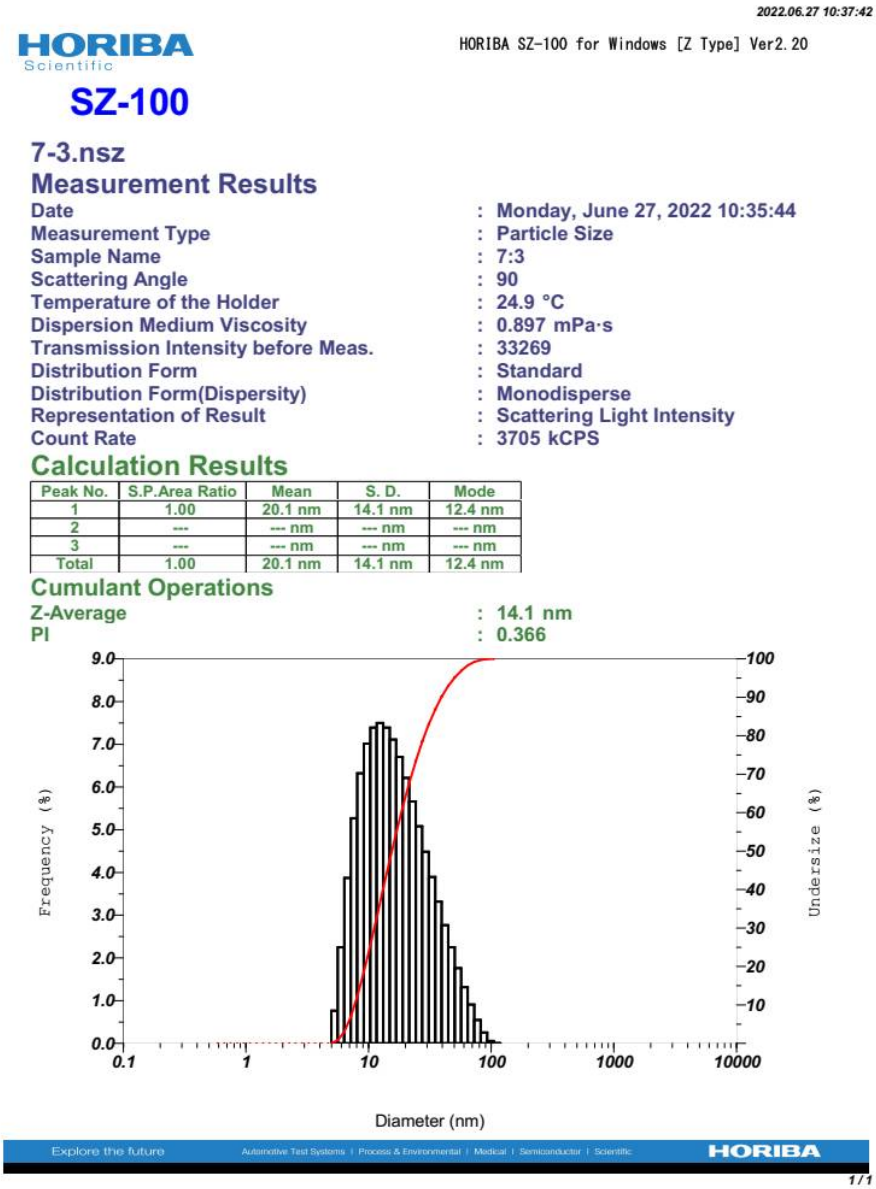

Figure S17. Size distribution of NCCs at optimized condition (first measurement).