

## Supporting Information

### Andrographolide-loaded silk fibroin nanoparticles

XU Zhongyu<sup>a</sup>, REN Jiangmeng<sup>a\*</sup>, JING Qiufang<sup>a</sup>, REN Fuzheng<sup>a</sup>, Huang Mengting<sup>a</sup>, Ding Wenrui<sup>a</sup> and ZENG Bubing<sup>a\*</sup>

<sup>a</sup> School of Pharmacy, East China University of Science and Technology, Shanghai, 200237, P. R. China.



**Figure S1** general production of RSF nanoparticles

**Table S1** infrared spectroscopy data of different silk fibroin status<sup>1</sup>

Entry	Amides I (cm <sup>-1</sup> )	Amides II (cm <sup>-1</sup> )	Amides III (cm <sup>-1</sup> )
$\beta$ -sheet	1625-1640	1515-1525	1265
$\alpha$ -helices	1650-1658	1545	1240
Random coil	1640-1648	1535-1545	1235

1. Y.-Q. Z. HaiYan Wang, *Soft Matter*, 2013, 9, 138-145.

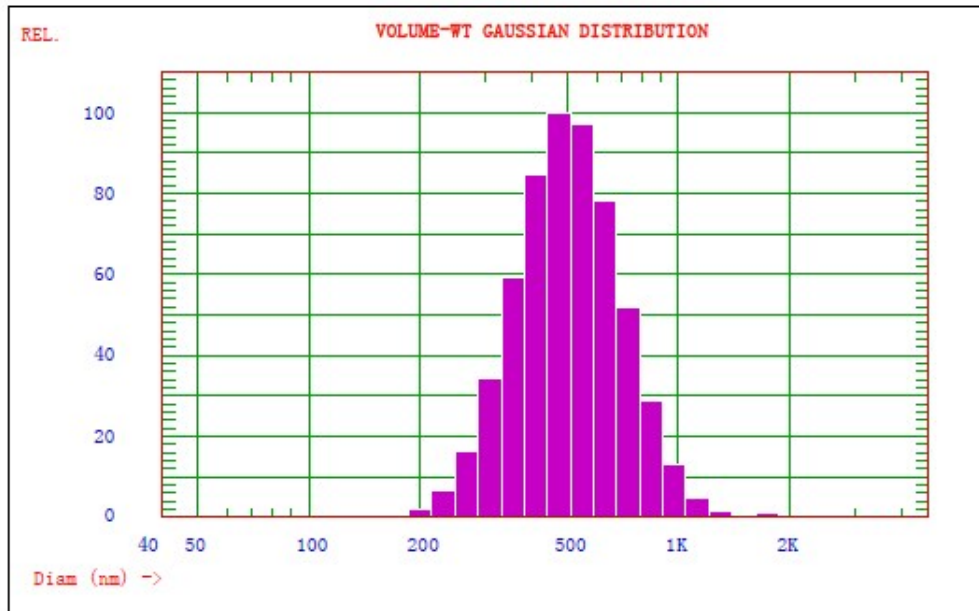
**Table S2** Characteristic of AP-loaded RSF nanoparticles suspension

Entry	RSF concentr	AP concentr	mPEGN H <sub>2</sub> (%)	ethanol :	freezing time	volume- Mean	variance (P.I.)
1	0.5	2	5%	0.2	5	528.2	0.108
2	0.5	4	10%	0.25	10	423.9	0.002
3	0.5	6	20%	0.4	20	332.0	0.107
4	0.5	7	30%	0.5	24	947.7	0.664
5	1	2	10%	0.4	24	322.8	0.097
6	1	4	5%	0.5	20	996.9	0.410
7	1	6	30%	0.2	10	378.7	0.412
8	1	7	20%	0.25	5	623.0	0.477
9	2	2	20%	0.5	10	>1000	/
10	2	4	30%	0.4	5	238.9	0.312
11	2	6	5%	0.25	24	503.4	0.333
12	2	7	10%	0.2	20	893.9	0.254
13	3	2	30%	0.25	20	495.7	0.479
14	3	4	20%	0.2	24	495.7	0.479
15	3	6	10%	0.5	5	>1000	/
16	3	7	5%	0.4	10	372.0	0.172

VOLUME-Weighted GAUSSIAN DISTRIBUTION Analysis (Solid Particle)

GAUSSIAN SUMMARY:

Mean Diameter	= 528.2 nm	Variance (P.I.)	= 0.108
Std. Deviation	= 173.8 nm (32.9%)	Chi Squared	= 2.558
Norm. Std. Dev.	= 0.329	Baseline Adj.	= 0.000 %
(Coeff. of Var'n)		Z-Avg. Diff. Coeff.	= 9.78E-009 cm <sup>2</sup> /s



Run\_Sample

Cumulative Result:

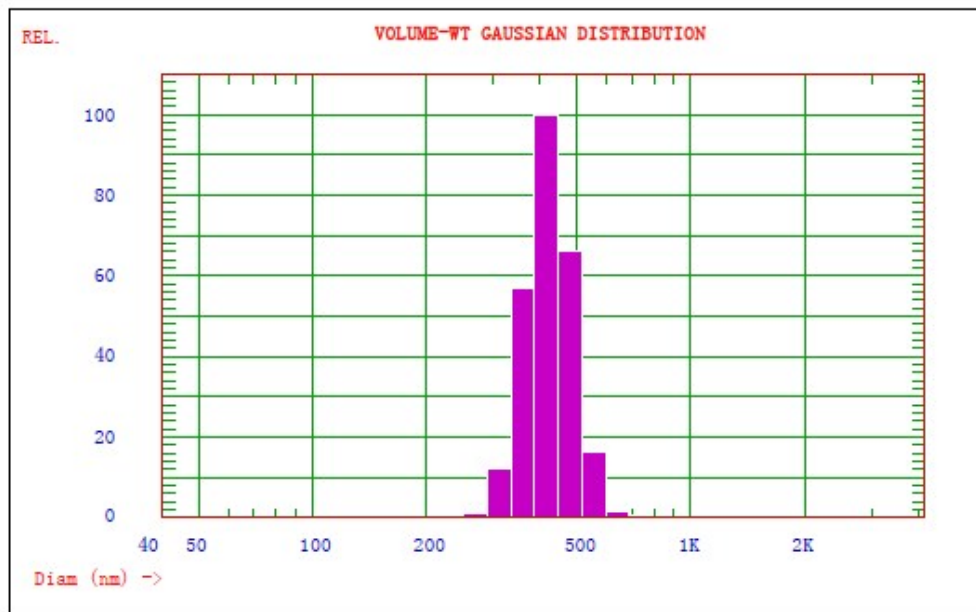
25 % of distribution < 400.6 nm  
50 % of distribution < 500.1 nm  
75 % of distribution < 624.4 nm  
90 % of distribution < 762.4 nm  
99 % of distribution < 1075.1 nm  
80 % of distribution < 659.7 nm

Figure S2. AP-loaded RSF nanoparticles sizing distribution of No.1

VOLUME-Weighted GAUSSIAN DISTRIBUTION Analysis (Solid Particle)

GAUSSIAN SUMMARY:

Mean Diameter	= 423.9 nm	Variance (P.I.)	= 0.021
Std. Deviation	= 61.5 nm (14.5%)	Chi Squared	= 1.843
Norm. Std. Dev.	= 0.145	Baseline Adj.	= 0.861 %
(Coeff. of Var'n)		Z-Avg. Diff. Coeff.	= 1.12E-008 cm <sup>2</sup> /s



Run\_Sample

Cumulative Result:

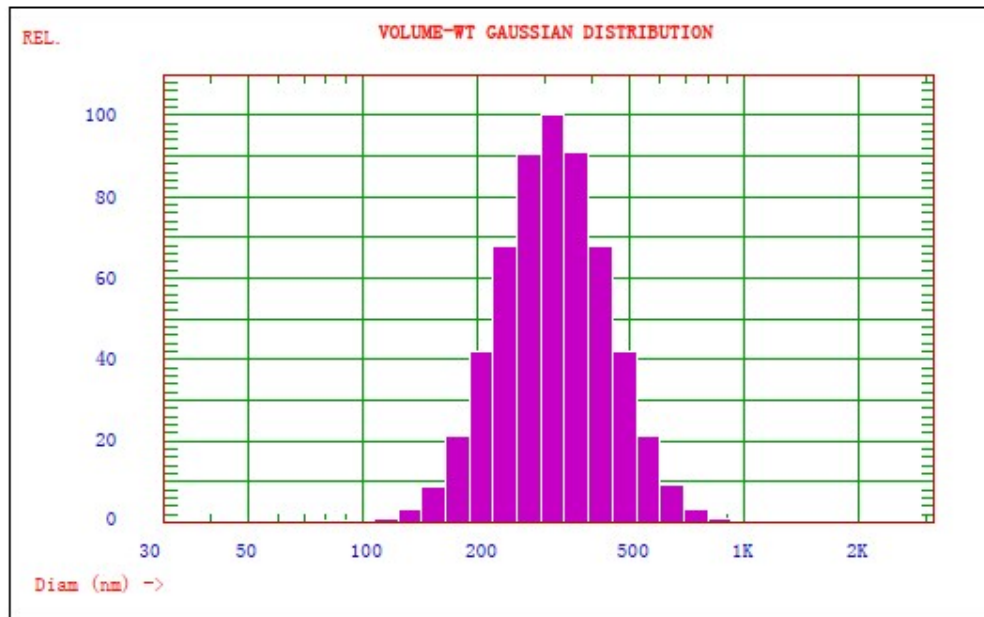
25 % of distribution < 380.2 nm  
50 % of distribution < 419.2 nm  
75 % of distribution < 462.3 nm  
90 % of distribution < 504.9 nm  
99 % of distribution < 587.4 nm  
80 % of distribution < 473.7 nm

Figure S3. AP-loaded RSF nanoparticles sizing distribution of No.2

VOLUME-Weighted GAUSSIAN DISTRIBUTION Analysis (Solid Particle)

GAUSSIAN SUMMARY:

Mean Diameter	= 332.0 nm	Variance (P.I.)	= 0.107
Std. Deviation	= 108.5 nm (32.7%)	Chi Squared	= 4.371
Norm. Std. Dev.	= 0.327	Baseline Adj.	= 0.918 %
(Coeff. of Var'n)		Z-Avg. Diff. Coeff.	= 1.48E-008 cm <sup>2</sup> /s



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Cumulative Result:

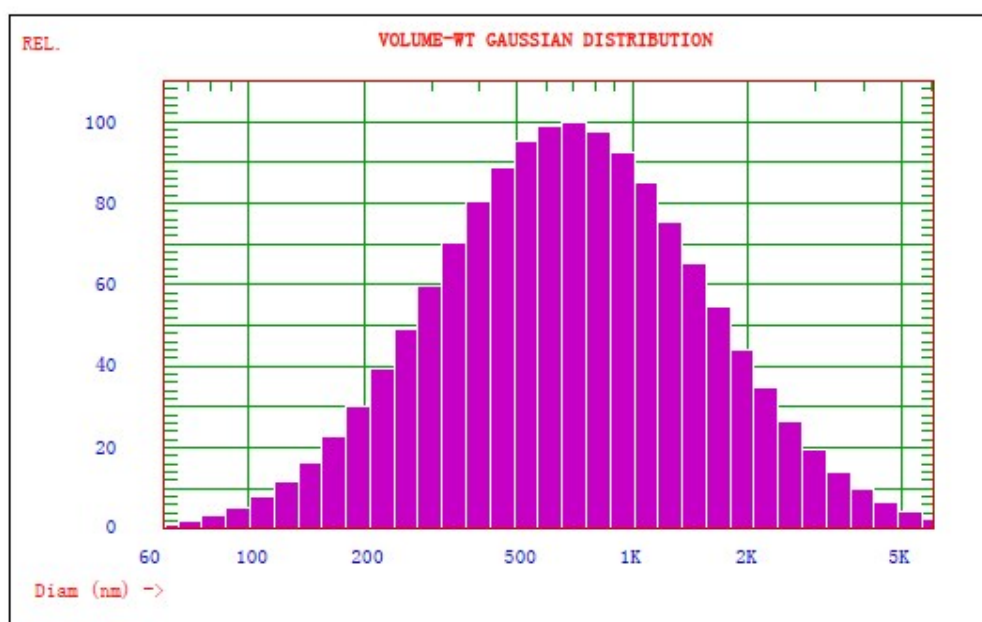
25 % of distribution < 252.3 nm  
50 % of distribution < 314.5 nm  
75 % of distribution < 392.1 nm  
90 % of distribution < 478.2 nm  
99 % of distribution < 673.0 nm  
80 % of distribution < 414.1 nm

Figure S4. AP-loaded RSF nanoparticles sizing distribution of No.3

VOLUME-Weighted GAUSSIAN DISTRIBUTION Analysis (Solid Particle)

GAUSSIAN SUMMARY:

Mean Diameter	= 947.7 nm	Variance (P.I.)	= 0.664
Std. Deviation	= 772.4 nm (81.5%)	Chi Squared	= 2.404
Norm. Std. Dev.	= 0.815	Baseline Adj.	= 0.033 %
(Coeff. of Var'n)		Z-Avg. Diff. Coeff.	= 7.62E-009 cm <sup>2</sup> /s



Run\_Sample

Cumulative Result:

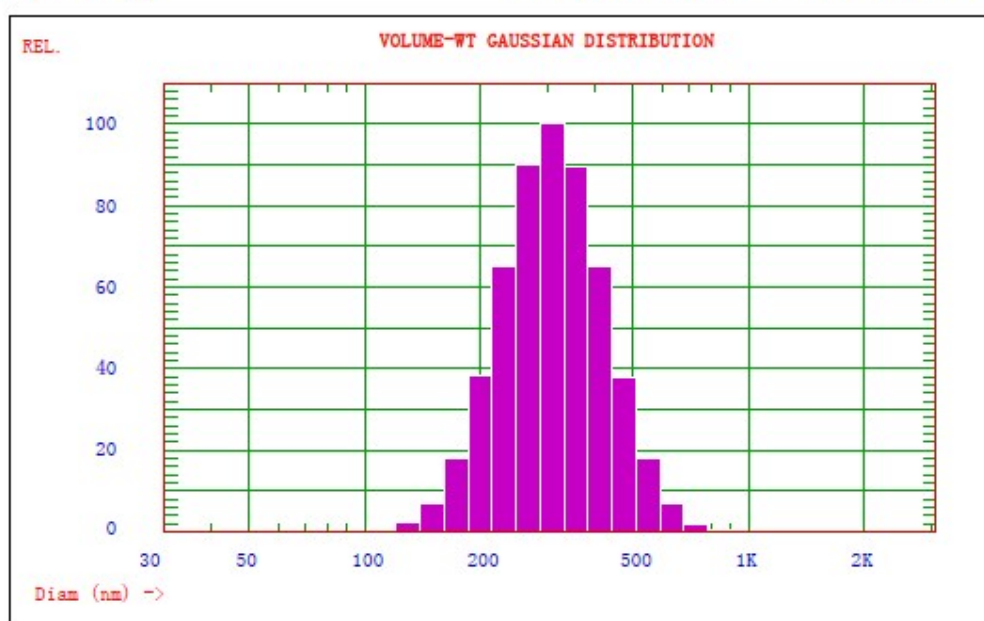
25 % of distribution < 393.3 nm  
50 % of distribution < 678.9 nm  
75 % of distribution < 1171.4 nm  
90 % of distribution < 1905.2 nm  
99 % of distribution < 4120.7 nm  
80 % of distribution < 1340.2 nm

Figure S5. AP-loaded RSF nanoparticles sizing distribution of No.4

VOLUME-Weighted GAUSSIAN DISTRIBUTION Analysis (Solid Particle)

GAUSSIAN SUMMARY:

Mean Diameter	= 322.8 nm	Variance (P.I.)	= 0.097
Std. Deviation	= 100.4 nm (31.1%)	Chi Squared	= 64.604
Norm. Std. Dev.	= 0.311	Baseline Adj.	= 1.099 %
(Coeff. of Var'n)		Z-Avg. Diff. Coeff.	= 1.51E-008 cm <sup>2</sup> /s



2016101201.5

Cumulative Result:

25 % of distribution < 249.2 nm  
50 % of distribution < 307.3 nm  
75 % of distribution < 379.1 nm  
90 % of distribution < 457.8 nm  
99 % of distribution < 633.6 nm  
80 % of distribution < 399.3 nm

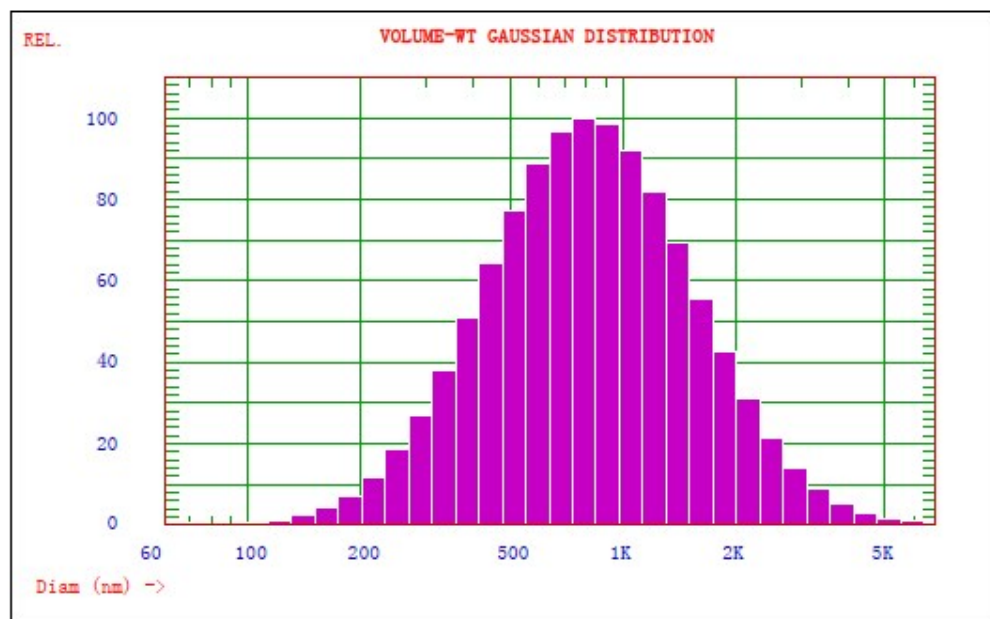
Figure S6. AP-loaded RSF nanoparticles sizing distribution of No.5



VOLUME-Weighted GAUSSIAN DISTRIBUTION Analysis (Solid Particle)

GAUSSIAN SUMMARY:

Mean Diameter	= 996.9 nm	Variance (P.I.)	= 0.410
Std. Deviation	= 638.0 nm (64.0%)	Chi Squared	= 496.772
Norm. Std. Dev.	= 0.640	Baseline Adj.	= 0.038 %
(Coeff. of Var'n)		Z-Avg. Diff. Coeff.	= 6.79E-009 cm <sup>2</sup> /s



Run\_Sample

Cumulative Result:

25 % of distribution < 527.2 nm  
50 % of distribution < 811.6 nm  
75 % of distribution < 1249.3 nm  
90 % of distribution < 1841.1 nm  
99 % of distribution < 3561.8 nm  
80 % of distribution < 1390.2 nm

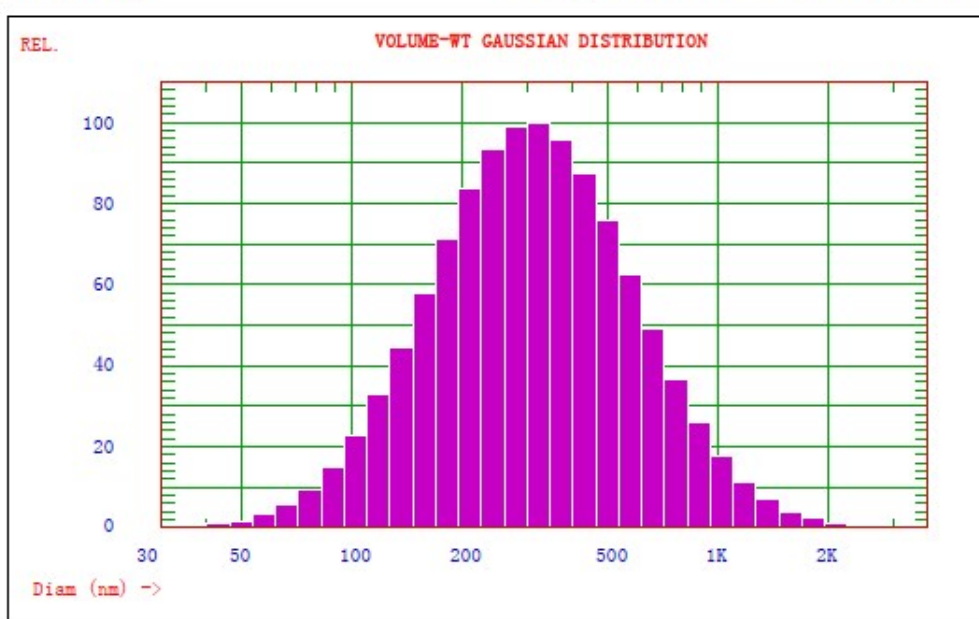
Figure S7. AP-loaded RSF nanoparticles sizing distribution of No.6



VOLUME-Weighted GAUSSIAN DISTRIBUTION Analysis (Solid Particle)

GAUSSIAN SUMMARY:

Mean Diameter	= 378.7 nm	Variance (P.I.)	= 0.412
Std. Deviation	= 243.1 nm (64.2%)	Chi Squared	= 568.010
Norm. Std. Dev.	= 0.642	Baseline Adj.	= 0.037 %
(Coeff. of Var'n)		Z-Avg. Diff. Coeff.	= 1.25E-008 cm <sup>2</sup> /s



Run\_Sample

Cumulative Result:

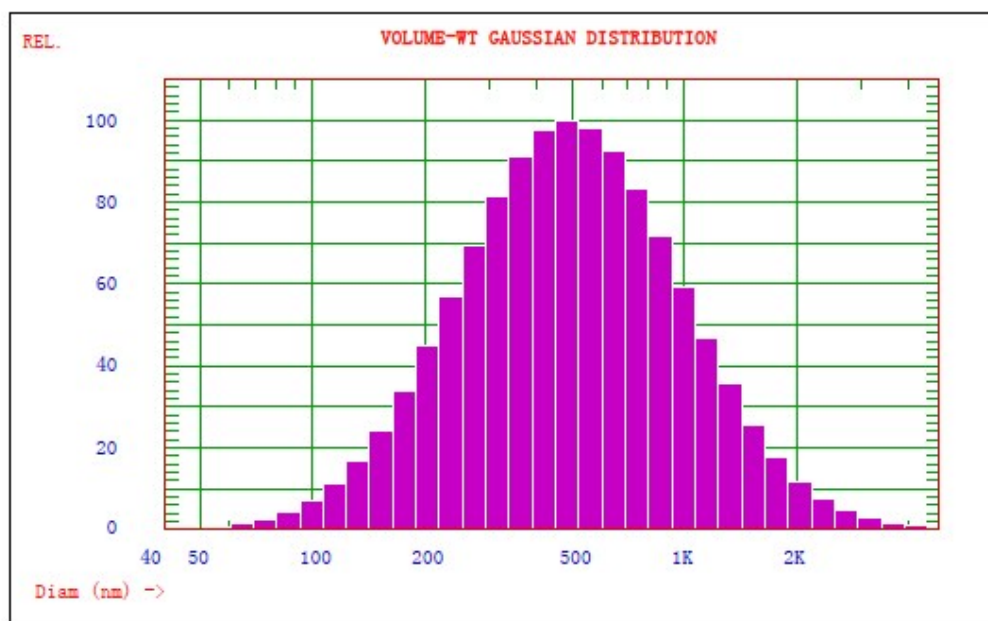
25 % of distribution < 200.1 nm  
50 % of distribution < 308.3 nm  
75 % of distribution < 475.2 nm  
90 % of distribution < 701.4 nm  
99 % of distribution < 1370.2 nm  
80 % of distribution < 528.9 nm

Figure S8. AP-loaded RSF nanoparticles sizing distribution of No.7

**VOLUME-Weighted GAUSSIAN DISTRIBUTION Analysis (Solid Particle)**

**GAUSSIAN SUMMARY:**

Mean Diameter	= 623.0 nm	Variance (P.I.)	= 0.477
Std. Deviation	= 430.5 nm (69.1%)	Chi Squared	= 52.596
Norm. Std. Dev.	= 0.691	Baseline Adj.	= 0.000 %
(Coeff. of Var'n)		Z-Avg. Diff. Coeff.	= 9.60E-009 cm <sup>2</sup> /s



*Run\_Sample*

**Cumulative Result:**

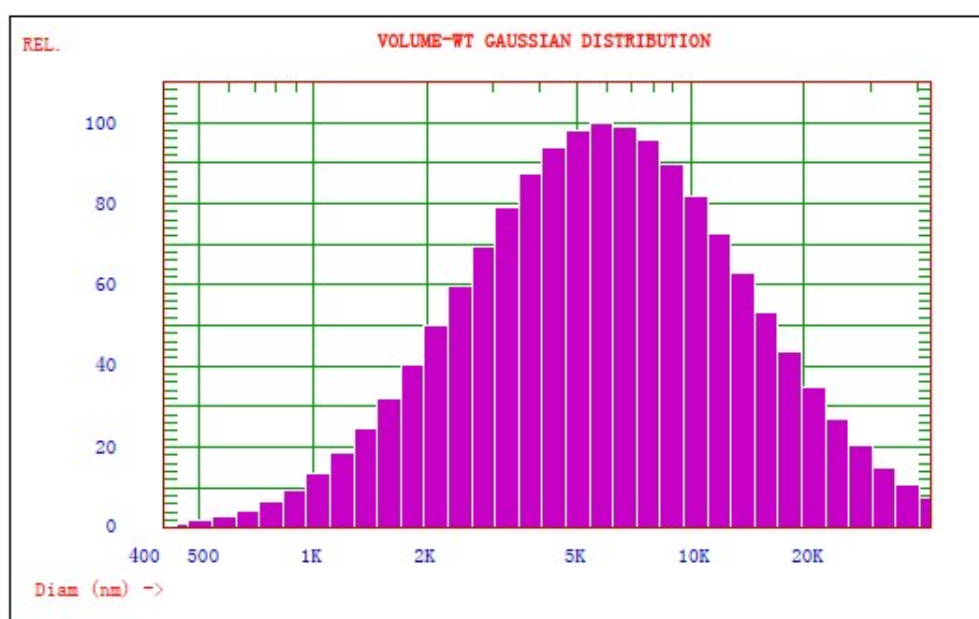
25 % of distribution < 308.1 nm  
50 % of distribution < 490.6 nm  
75 % of distribution < 781.4 nm  
90 % of distribution < 1187.5 nm  
99 % of distribution < 2419.7 nm  
80 % of distribution < 876.9 nm

**Figure S9. AP-loaded RSF nanoparticles sizing distribution of No.8**

VOLUME-Weighted GAUSSIAN DISTRIBUTION Analysis (Solid Particle)

GAUSSIAN SUMMARY:

Mean Diameter	= 8693.5 nm	Variance (P.I.)	= 0.762
Std. Deviation	= 7589.4 nm (87.3%)	Chi Squared	= 17254.455
Norm. Std. Dev.	= 0.873	Baseline Adj.	= 0.000 %
(Coeff. of Var'n)		Z-Avg. Diff. Coeff.	= 1.07E-009 cm <sup>2</sup> /s



Run\_Sample

Cumulative Result:

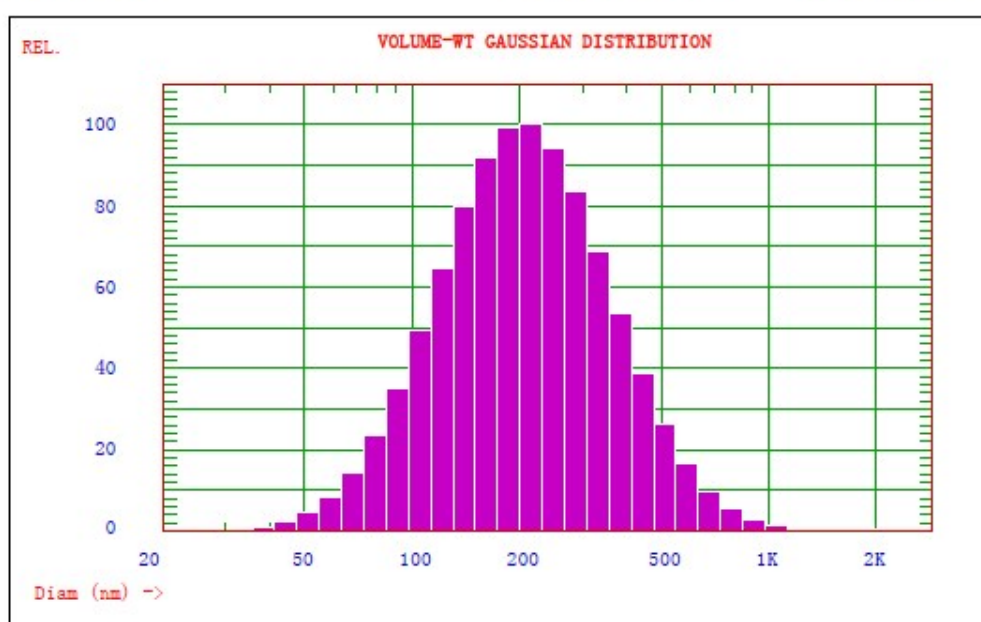
25 % of distribution < 3284.3 nm  
50 % of distribution < 5877.6 nm  
75 % of distribution < 10467.6 nm  
90 % of distribution < 17322.9 nm  
99 % of distribution < 34935.6 nm  
80 % of distribution < 12052.8 nm

Figure S10. AP-loaded RSF nanoparticles sizing distribution of No.9

VOLUME-Weighted GAUSSIAN DISTRIBUTION Analysis (Solid Particle)

GAUSSIAN SUMMARY:

Mean Diameter	= 238.9 nm	Variance (P.I.)	= 0.312
Std. Deviation	= 133.5 nm (55.9%)	Chi Squared	= 2006.459
Norm. Std. Dev.	= 0.559	Baseline Adj.	= 0.058 %
(Coeff. of Var'n)		Z-Avg. Diff. Coeff.	= 1.62E-008 cm <sup>2</sup> /s



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Cumulative Result:

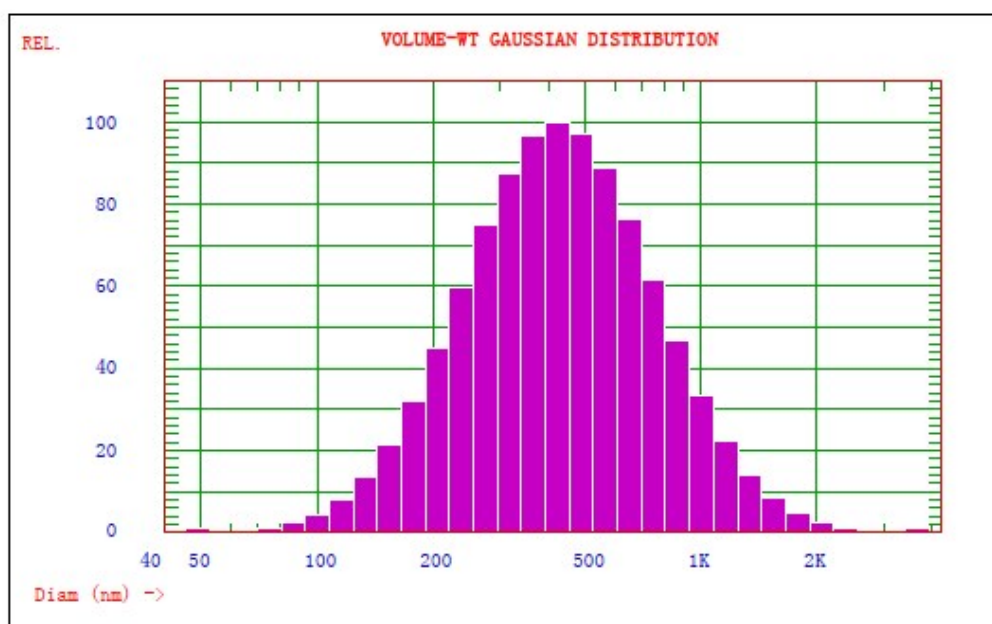
25 % of distribution < 140.2 nm  
50 % of distribution < 204.3 nm  
75 % of distribution < 297.8 nm  
90 % of distribution < 418.1 nm  
99 % of distribution < 749.7 nm  
80 % of distribution < 327.0 nm

Figure S11. AP-loaded RSF nanoparticles sizing distribution of No.10

VOLUME-Weighted GAUSSIAN DISTRIBUTION Analysis (Solid Particle)

GAUSSIAN SUMMARY:

Mean Diameter	= 503.4 nm	Variance (P.I.)	= 0.333
Std. Deviation	= 290.4 nm (57.7%)	Chi Squared	= 138.355
Norm. Std. Dev.	= 0.577	Baseline Adj.	= 0.057 %
(Coeff. of Var'n)		Z-Avg. Diff. Coeff.	= 1.10E-008 cm <sup>2</sup> /s



*Run\_Sample*

Cumulative Result:

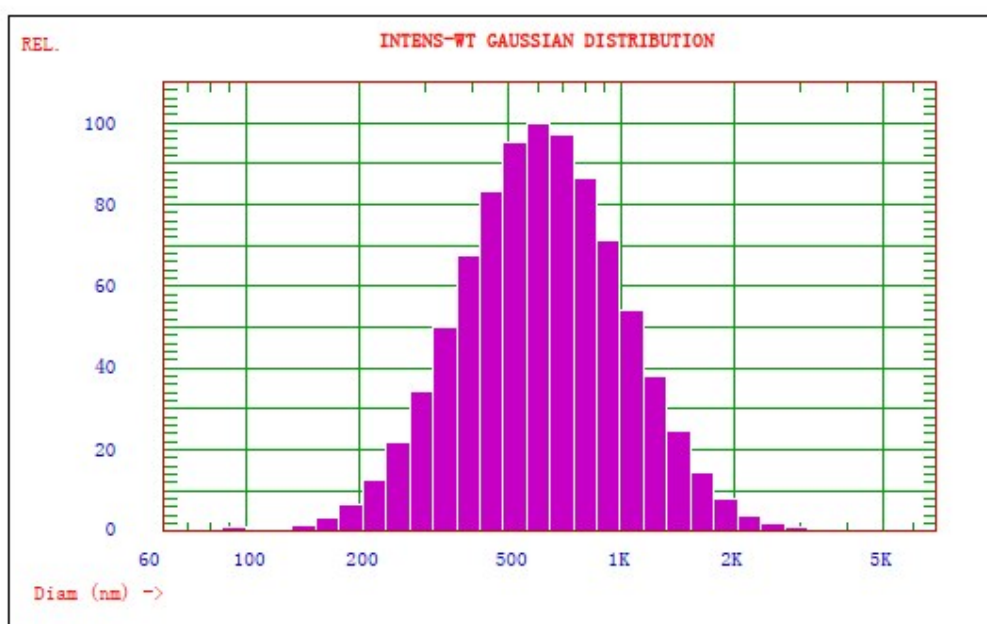
25 % of distribution < 288.6 nm  
50 % of distribution < 425.9 nm  
75 % of distribution < 628.6 nm  
90 % of distribution < 892.2 nm  
99 % of distribution < 1629.2 nm

Figure S12. AP-loaded RSF nanoparticles sizing distribution of No.11

INTENSITY-Weighted GAUSSIAN DISTRIBUTION Analysis (Solid Particle)

GAUSSIAN SUMMARY:

Mean Diameter	= 695.9 nm	Variance (P.I.)	= 0.254
Std. Deviation	= 350.7 nm (50.4%)	Chi Squared	= 50.632
Norm. Std. Dev.	= 0.504	Baseline Adj.	= 0.000 %
(Coeff. of Var'n)		Z-Avg. Diff. Coeff.	= 6.68E-009 cm <sup>2</sup> /s



Run\_Sample

Cumulative Result:

25 % of distribution < 436.1 nm  
50 % of distribution < 612.6 nm  
75 % of distribution < 860.6 nm  
90 % of distribution < 1168.6 nm  
99 % of distribution < 1978.6 nm  
80 % of distribution < 936.2 nm

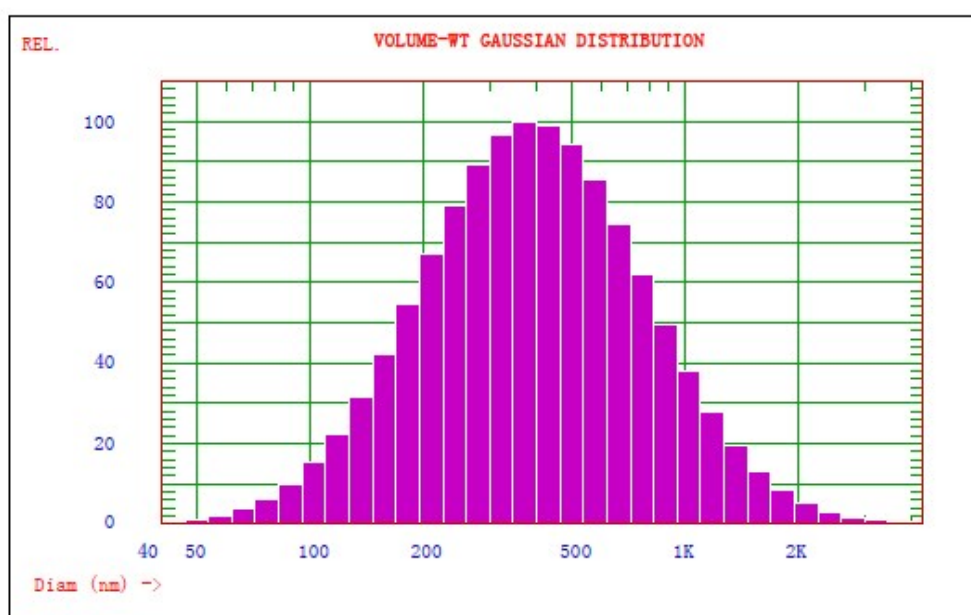
Figure S13. AP-loaded RSF nanoparticles sizing distribution of No.12



VOLUME-Weighted GAUSSIAN DISTRIBUTION Analysis (Solid Particle)

GAUSSIAN SUMMARY:

Mean Diameter	= 495.7 nm	Variance (P.I.)	= 0.479
Std. Deviation	= 343.1 nm (69.2%)	Chi Squared	= 393.217
Norm. Std. Dev.	= 0.692	Baseline Adj.	= 0.000 %
(Coeff. of Var'n)		Z-Avg. Diff. Coeff.	= 1.08E-008 cm <sup>2</sup> /s



Run\_Sample

Cumulative Result:

25 % of distribution < 245.1 nm  
50 % of distribution < 390.4 nm  
75 % of distribution < 622.2 nm  
90 % of distribution < 946.3 nm  
99 % of distribution < 1938.5 nm  
80 % of distribution < 698.3 nm

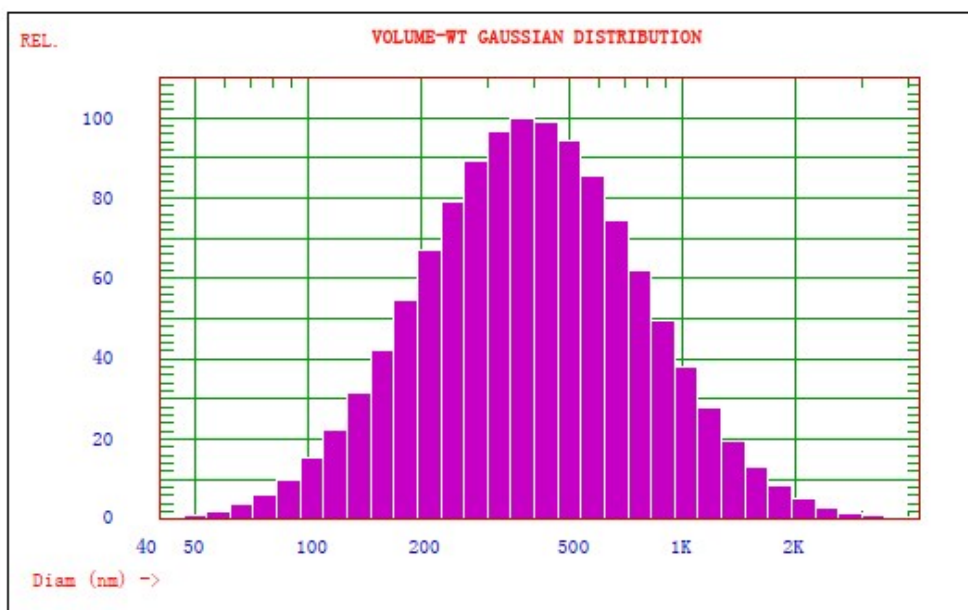
Figure S14. AP-loaded RSF nanoparticles sizing distribution of No.13



VOLUME-Weighted GAUSSIAN DISTRIBUTION Analysis (Solid Particle)

GAUSSIAN SUMMARY:

Mean Diameter	= 495.7 nm	Variance (P.I.)	= 0.479
Std. Deviation	= 343.1 nm (69.2%)	Chi Squared	= 393.217
Norm. Std. Dev.	= 0.692	Baseline Adj.	= 0.000 %
(Coeff. of Var'n)		Z-Avg. Diff. Coeff.	= 1.08E-008 cm <sup>2</sup> /s



Run\_Sample

Cumulative Result:

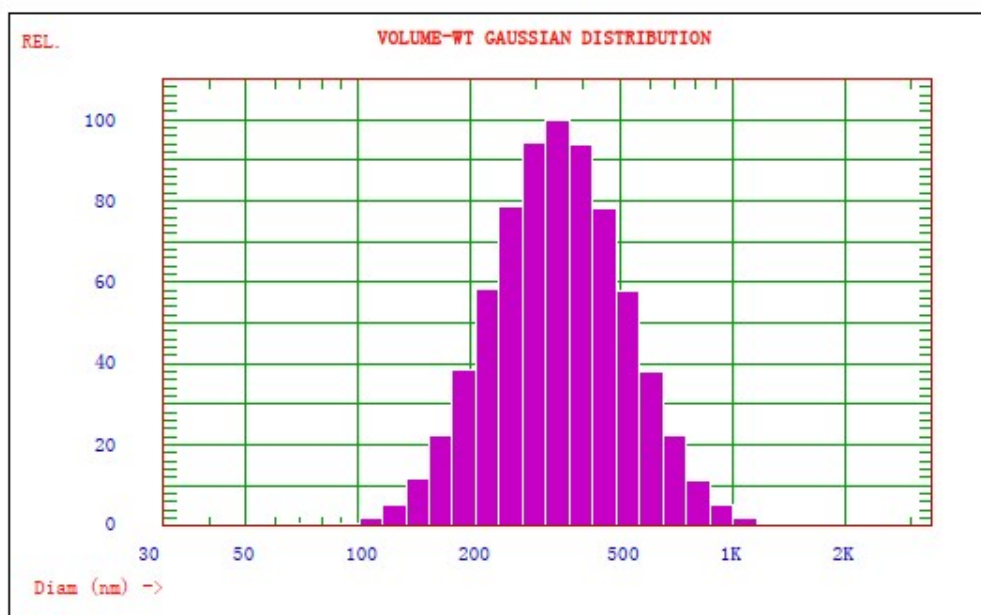
25 % of distribution < 245.1 nm  
50 % of distribution < 390.4 nm  
75 % of distribution < 622.2 nm  
90 % of distribution < 946.3 nm  
99 % of distribution < 1938.5 nm  
80 % of distribution < 698.3 nm

Figure S15. AP-loaded RSF nanoparticles sizing distribution of No.14

VOLUME-Weighted GAUSSIAN DISTRIBUTION Analysis (Solid Particle)

GAUSSIAN SUMMARY:

Mean Diameter	= 372.0 nm	Variance (P.I.)	= 0.172
Std. Deviation	= 154.4 nm (41.5%)	Chi Squared	= 76.511
Norm. Std. Dev.	= 0.415	Baseline Adj.	= 1.084 %
(Coeff. of Var'n)		Z-Avg. Diff. Coeff.	= 1.36E-008 cm <sup>2</sup> /s

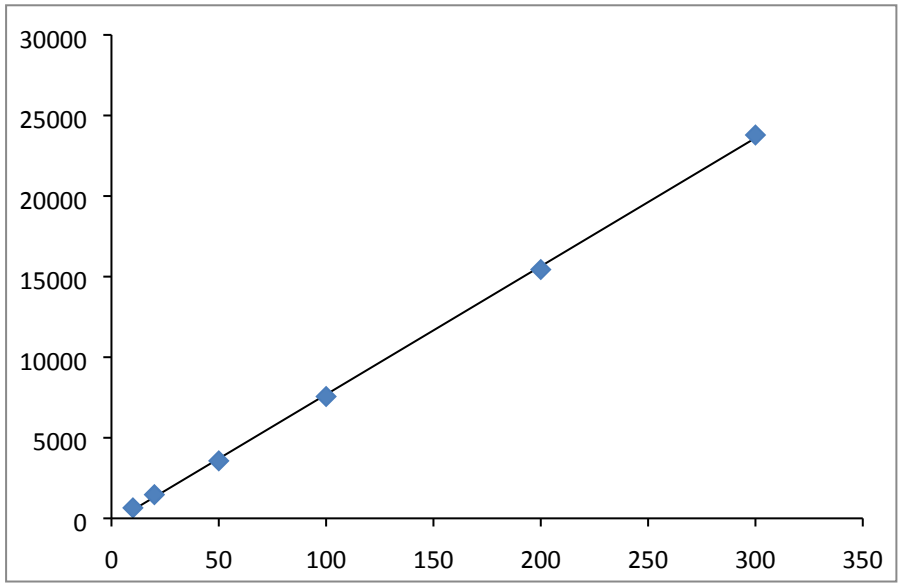


Run\_Sample

Cumulative Result:

25 % of distribution < 257.8 nm  
50 % of distribution < 341.1 nm  
75 % of distribution < 451.2 nm  
90 % of distribution < 580.5 nm  
99 % of distribution < 895.6 nm  
80 % of distribution < 483.7 nm

Figure S16. AP-loaded RSF nanoparticles sizing distribution of No.16



**Figure S17** Standard curve of AP by HPLC

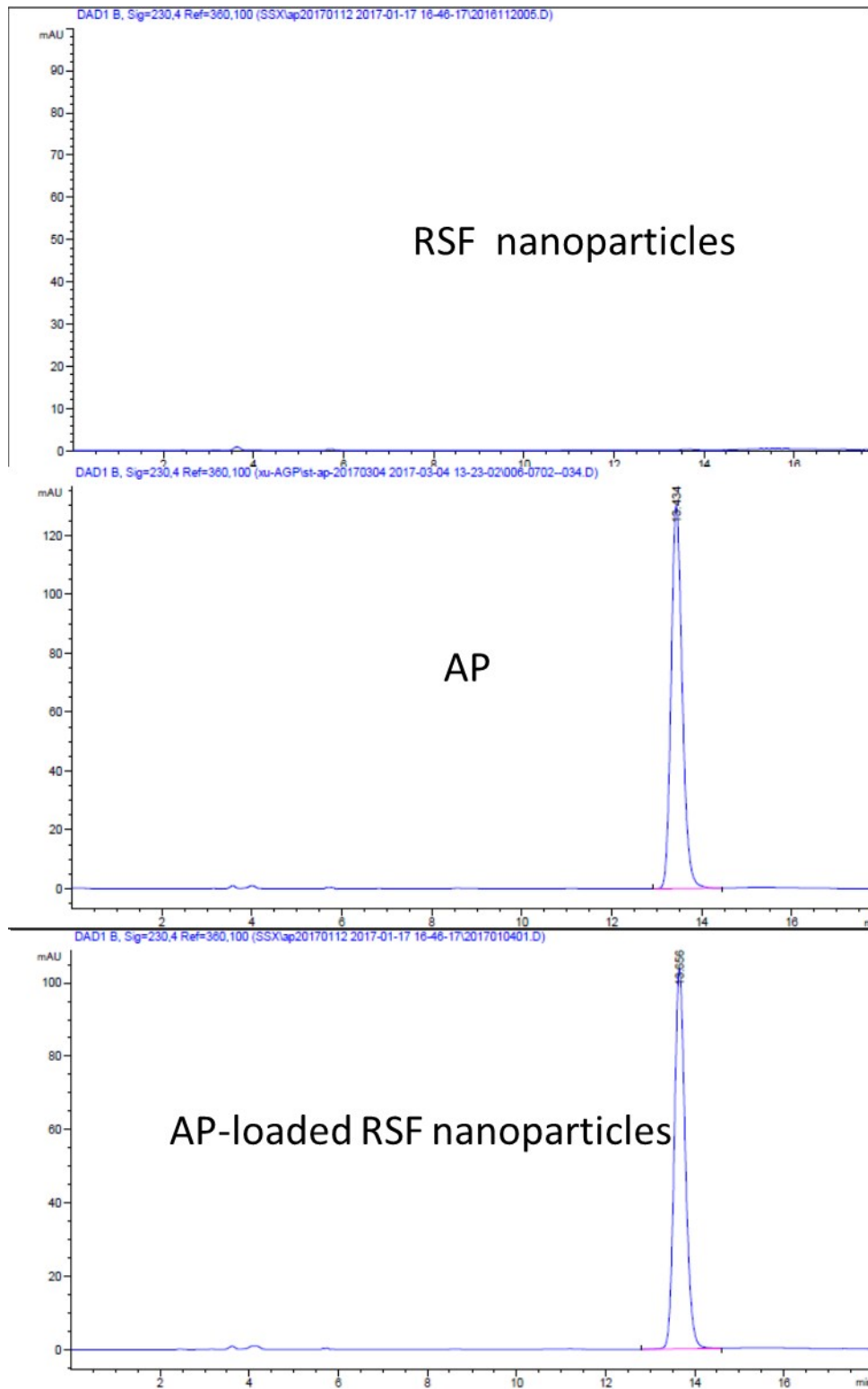


Figure S18 HPLC of AP-loaded RSFnanoparticle

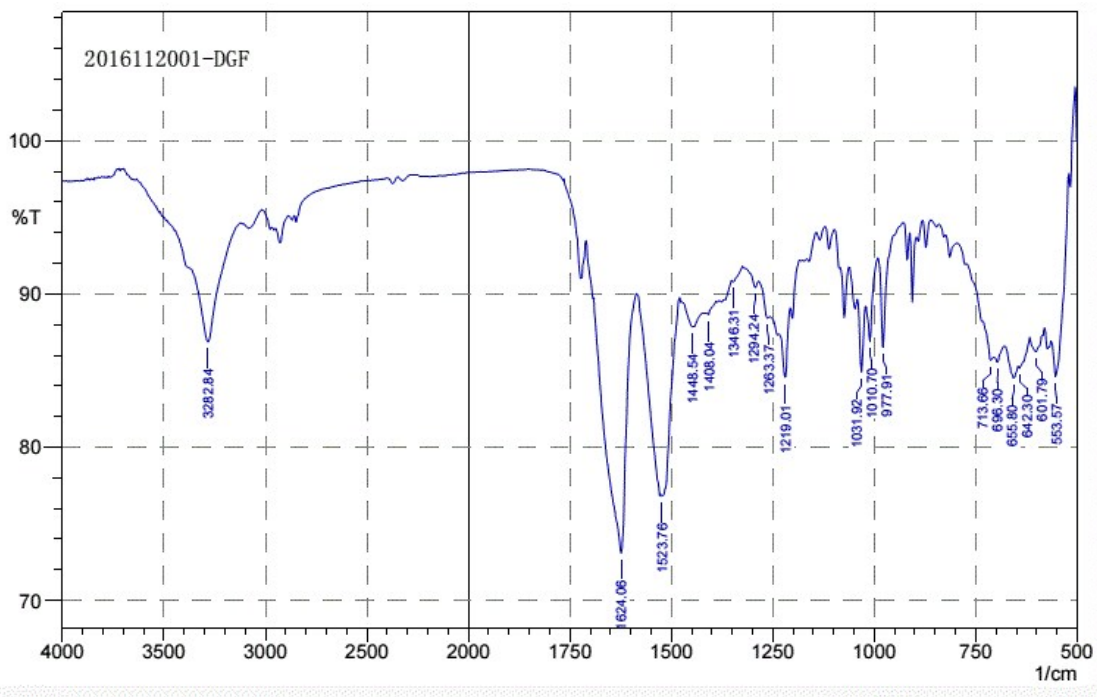


Figure S19 FT-IR spectra of RSFNPs1

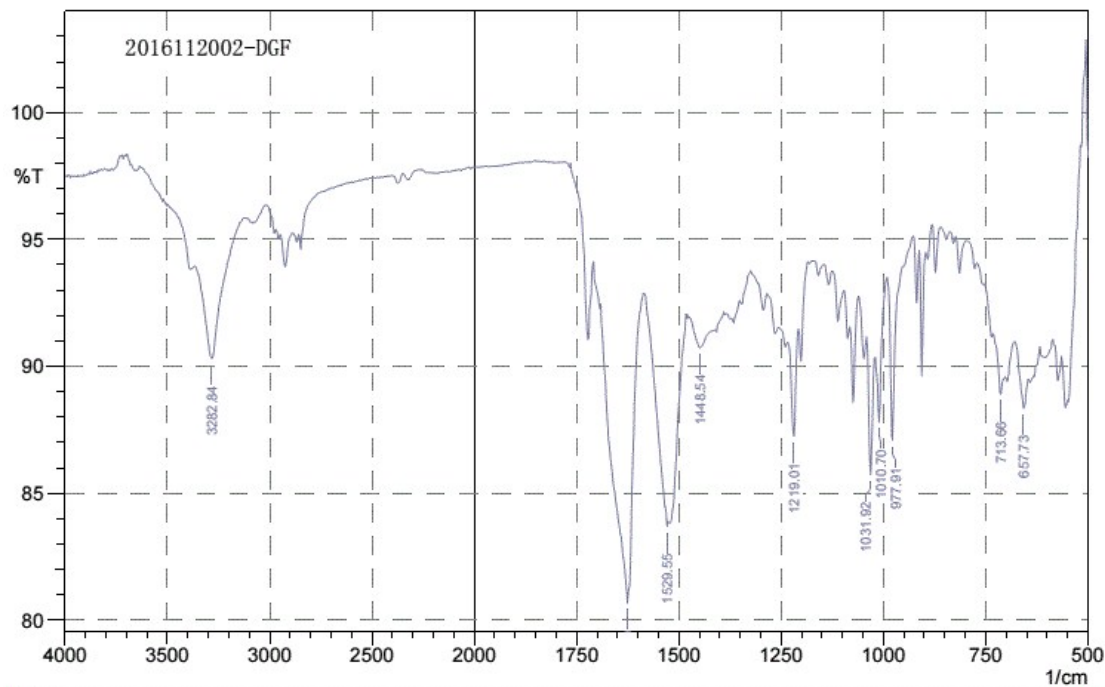


Figure S20 FT-IR spectra of RSFNPs2

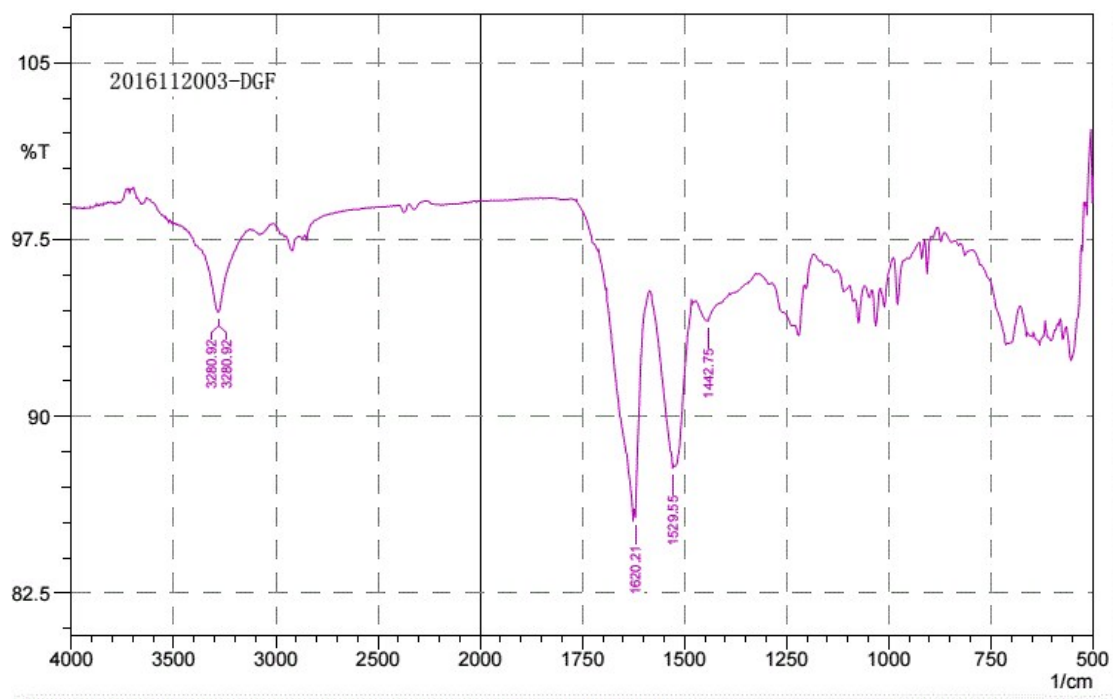


Figure S21 FT-IR spectra of RSNPs3

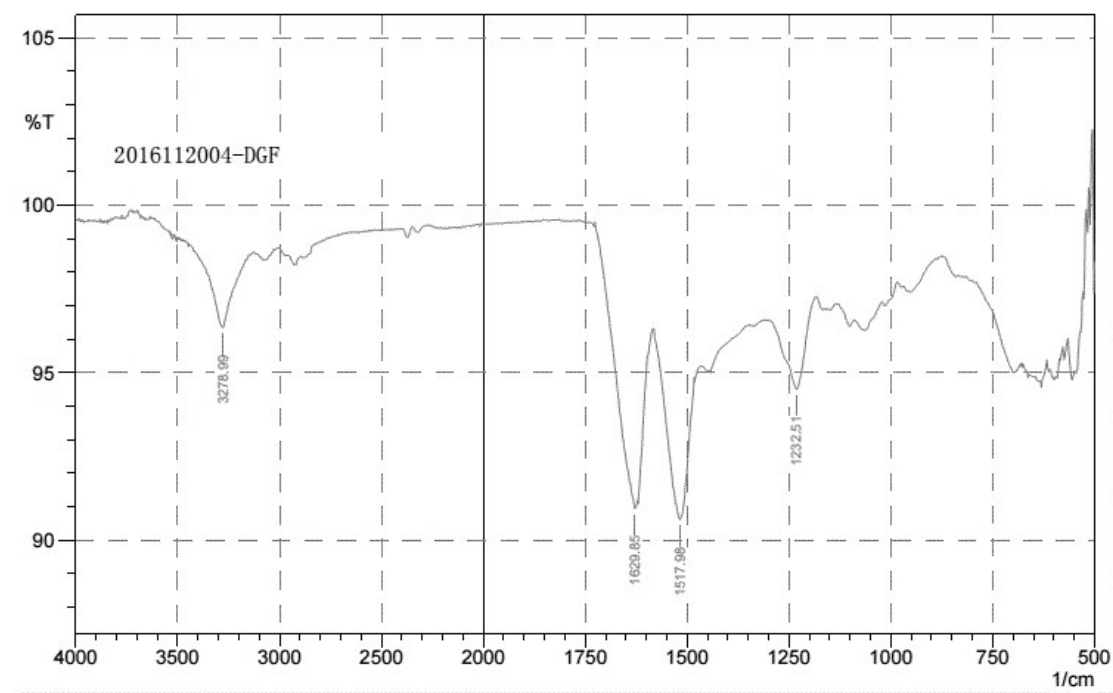


Figure S22 FT-IR spectra of RSNPs4

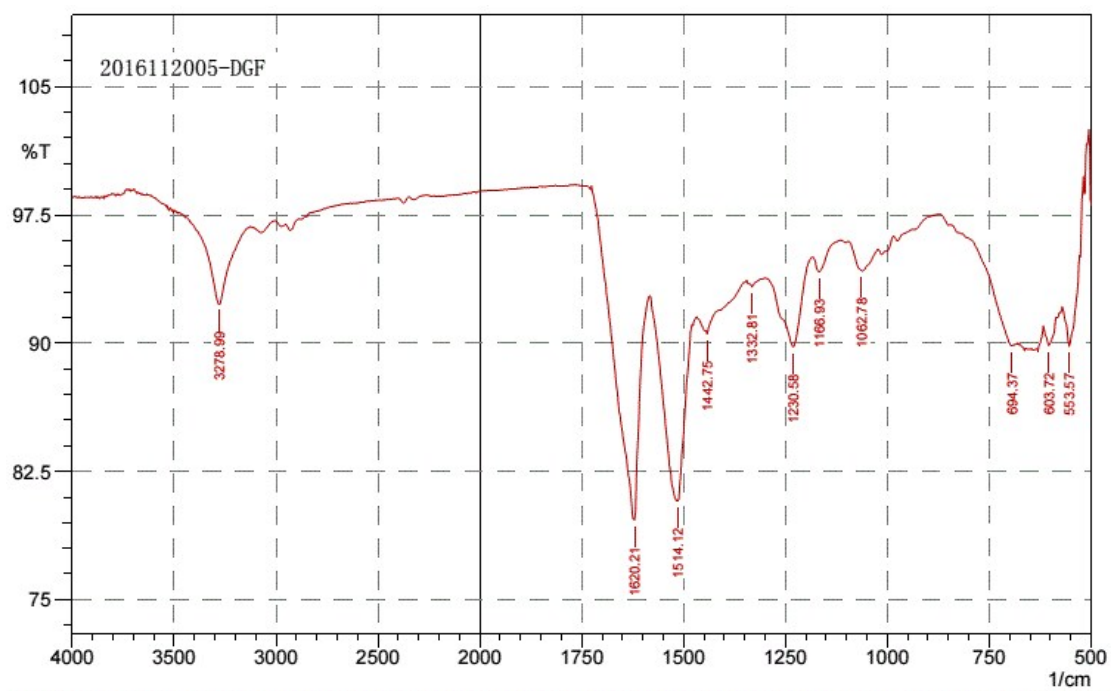


Figure S23 FT-IR spectra of RSNPs5

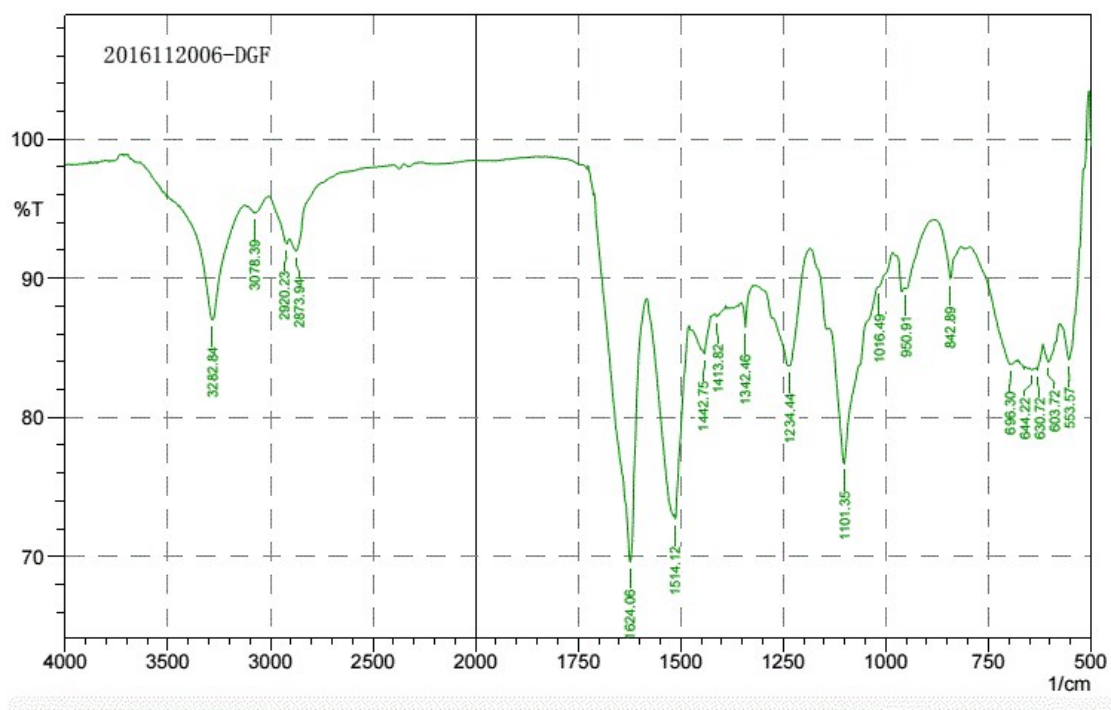


Figure S24 FT-IR spectra of RSNPs6



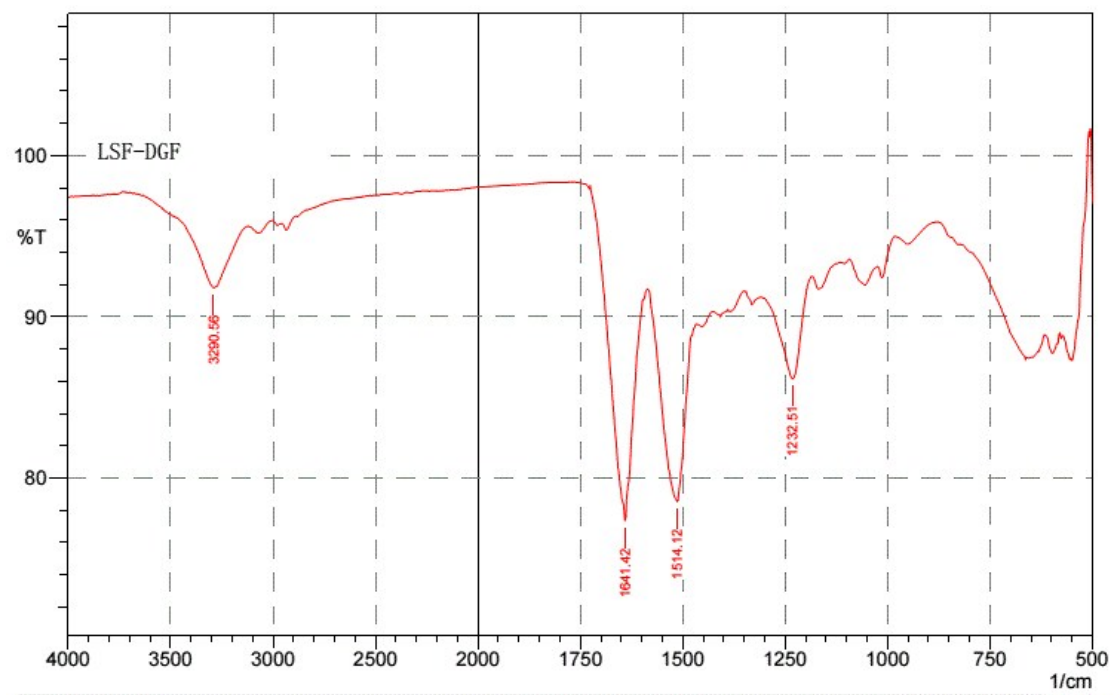


Figure S25 FT-IR spectra of RSF

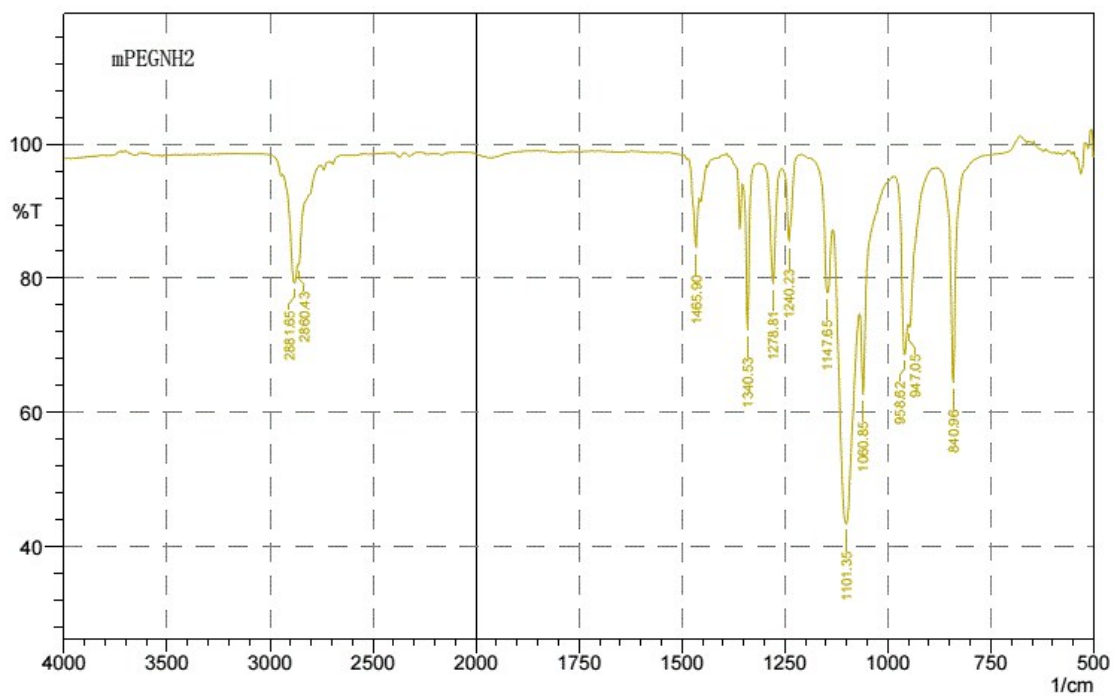
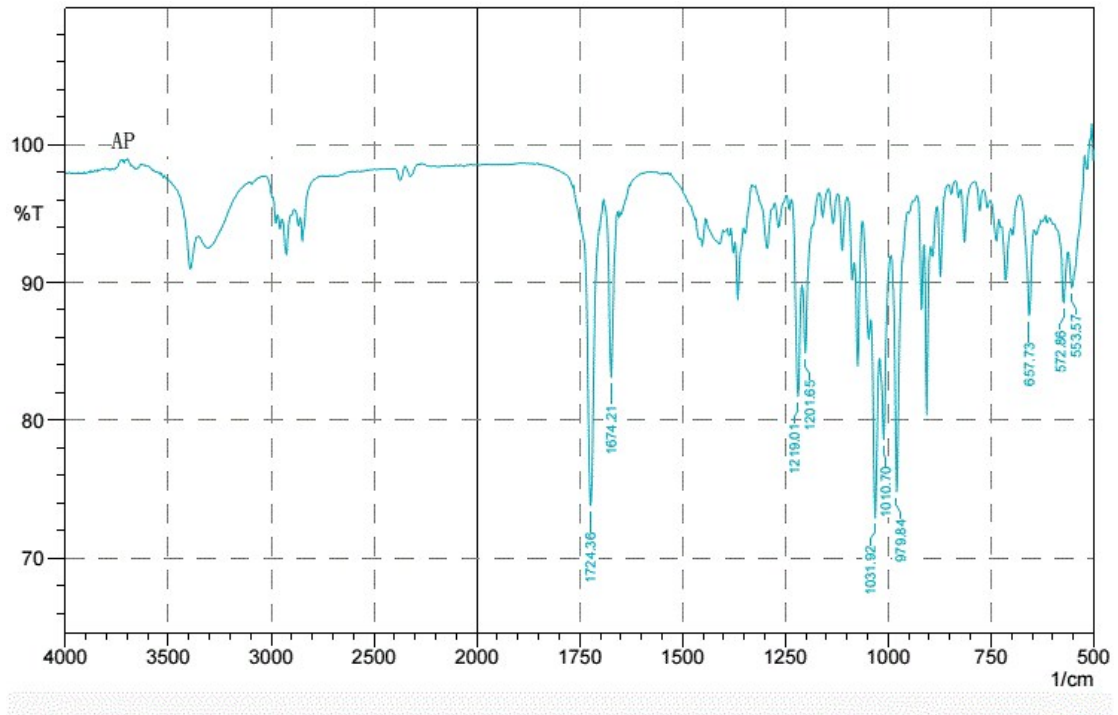
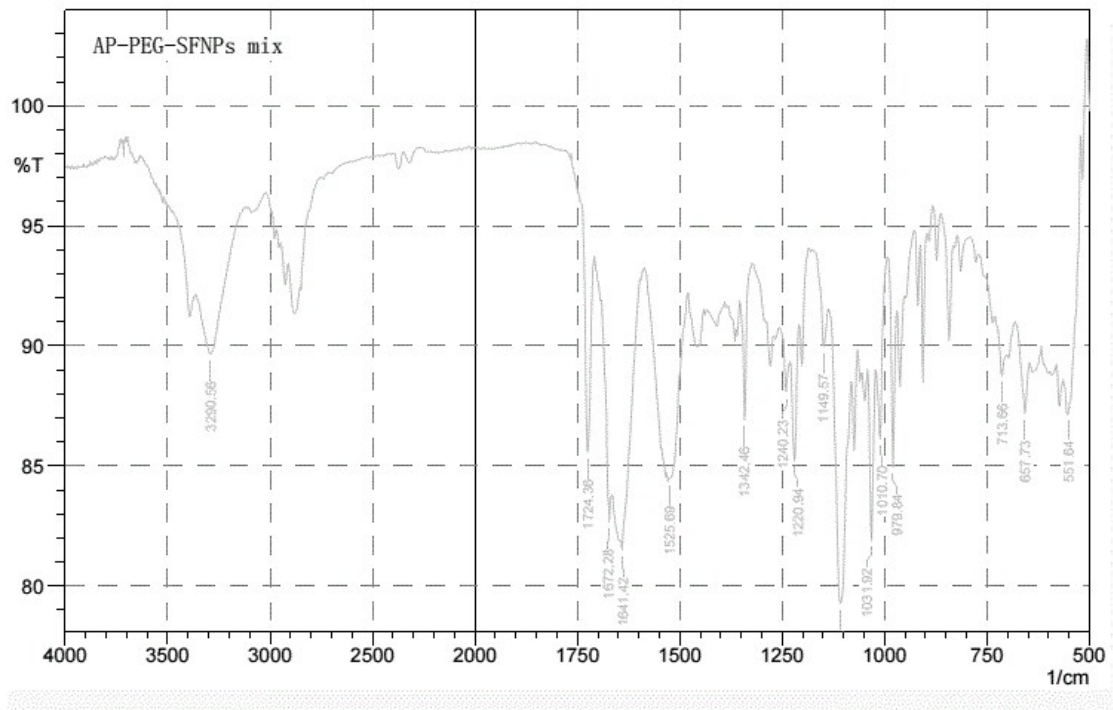


Figure S26 FT-IR spectra of mPEGNH<sub>2</sub>



**Figure S27** FT-IR spectra of AP



**Figure S28** FT-IR spectra of physical mixture of AP, PEG and SFNPs