Electronic Supplementary Material (ESI) for Journal of Materials Chemistry B.

Multifunctional gene delivery vectors containing different liver-targeting fragments for specifically transfecting hepatocellular carcinoma (HCC) cells

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Table S2. The concentrations of peptide/DNA complexes in the cytotoxicity analysis.

Figure S5. Flow cytometric analysis of cellular uptake mechanisms of H-02/DNA (A) and H-09/DNA (B) complexes in HepG2 cells using specific endocytosis inbitors. The DNA was labeled with YOYO-1.

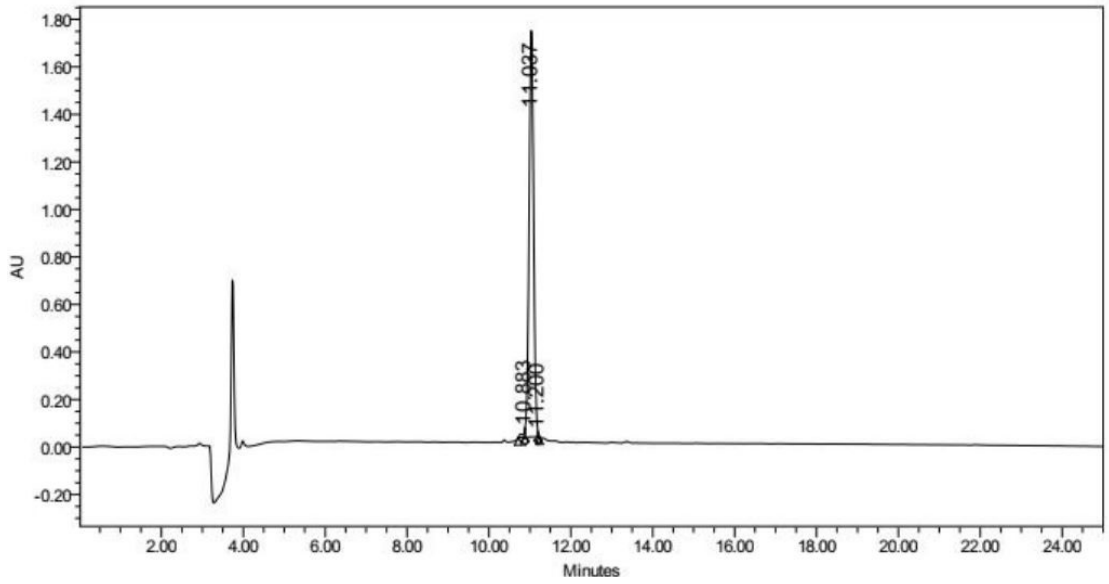
Table S3. The mean intensity of the green fluorescence in HepG2 and LO2 cells measured by ImageJ in CLSM analysis.

Table S4. The CLR of DAPI and YOYO-1 in live-cell imaging experiments.

Table S1. Sequences and molecular weights of peptides.

Compounds	Peptide sequences	MWs	
		Calculated	Measured
H-01	K(C_{18})-(LLHH)$_3$-R_9	3359.38	3361.07
H-02	KVGGNY-K(C_{18})-(LLHH)$_3$-R_9	3937.82	3938.32
H-03	KVGGNYNYLYRLF-K(C_{18})-(LLHH)$_3$-R_9	4907.94	4909.86
H-04	NGVEGFN-K(C_{18})-(LLHH)$_3$-R_9	4036.86	4037.77
H-05	HAIYPRH-K(C_{18})-(LLHH)$_3$-R_9	4194.12	4191.07
H-06	AHLHNRS-K(C_{18})-(LLHH)$_3$-R_9	4135.00	4132.08
H-07	DYEMHLWWGTEL-K(C_{18})-(LLHH)$_3$-R_9	4880.84	4877.56
H-08	THVSPNQGGLPS-K(C_{18})-(LLHH)$_3$-R_9	4494.38	4491.35
H-09	KSLSRHDHIHHH-K(C_{18})-(LLHH)$_3$-R_9	4804.75	4803.59
H-10	SFSIIHTPILPL-K(C_{18})-(LLHH)$_3$-R_9	4638.72	4635.55
H-11	GNY-K(C_{18})-(LLHH)$_3$-R_9	3653.46	3652.47
H-12	GVKYNG-K(C_{18})-(LLHH)$_3$-R_9	3937.82	3934.97
H-13	DHIHHH-K(C_{18})-(LLHH)$_3$-R_9	4095.95	4095.23
H-14	HKHDSHLISHRH-K(C_{18})-(LLHH)$_3$-R_9	4804.75	4801.88
H-15	KVGGNY	635.72	637.05
H-16	KSLSRHDHIHHH	1502.65	1502.47
H-17	K(C_{18})-C(Cy5.5)-(LLHH)$_3$-R_9	4127.11	4131.12
H-18	KSLSRHDHIHHH-K(C_{18})-C(Cy5.5)-(LLHH)$_3$-R_9	5612.74	5617.75

H-01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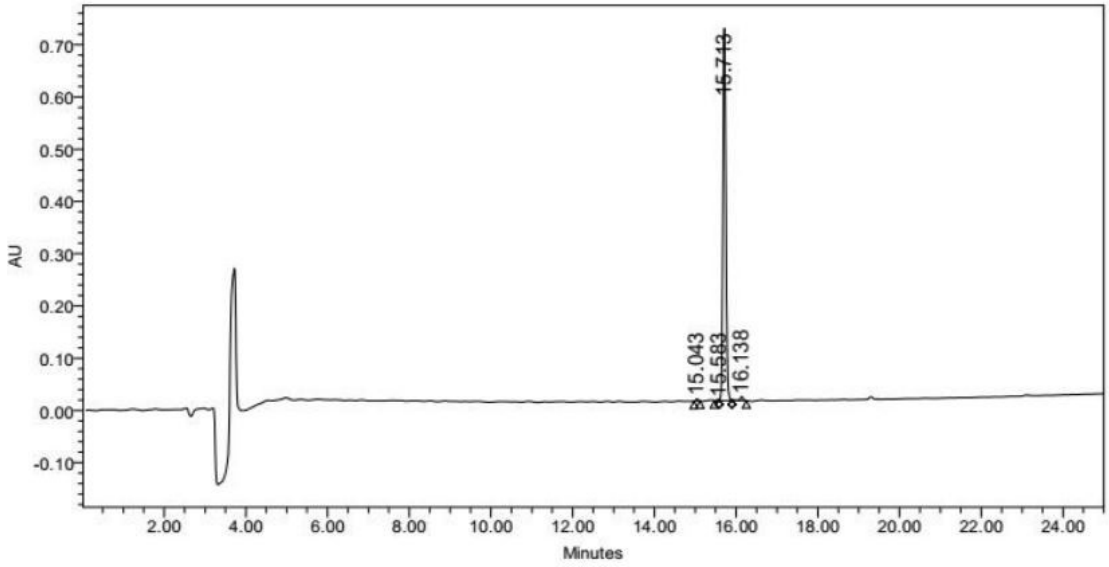
H-02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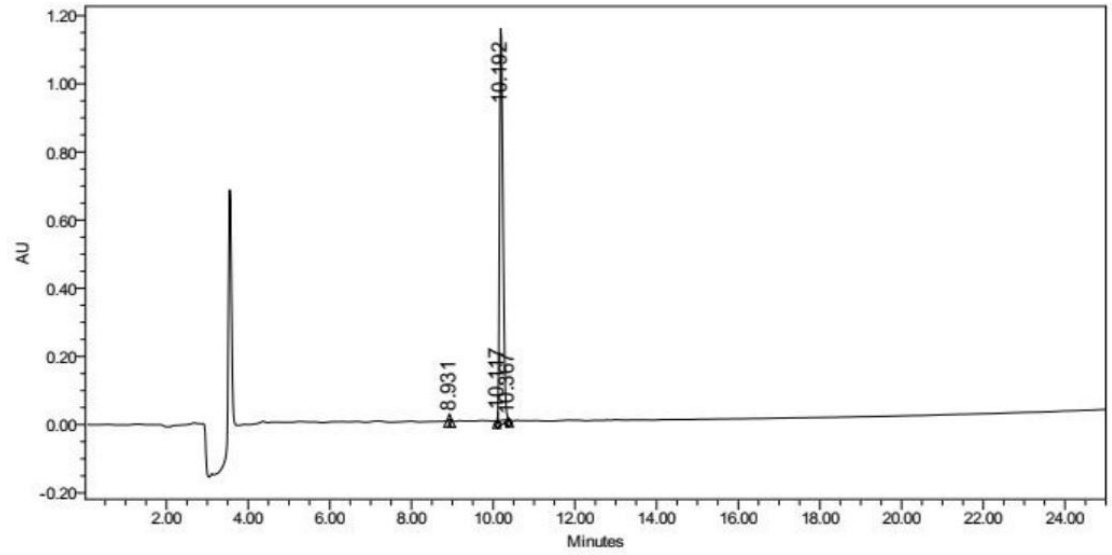
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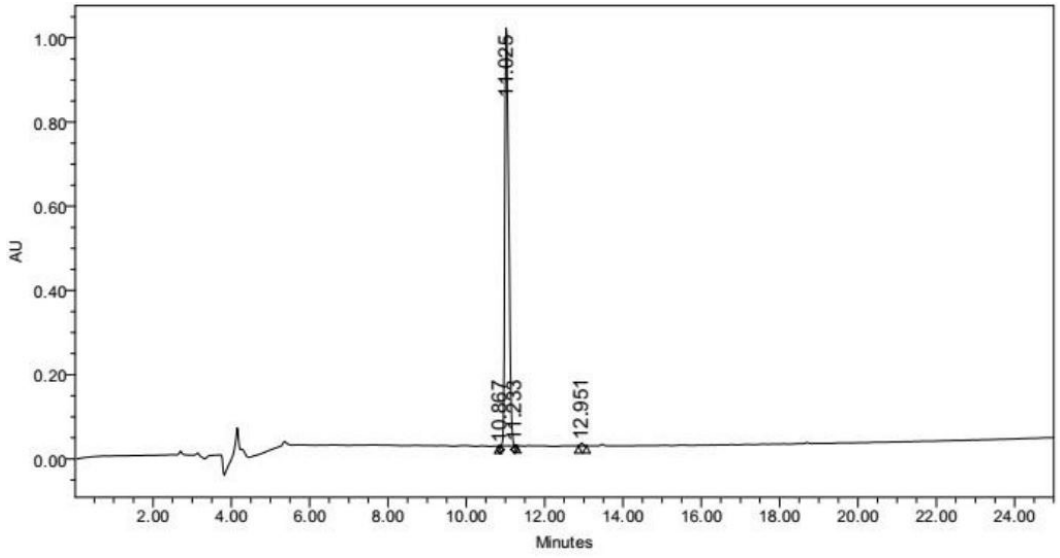
10.367

H-04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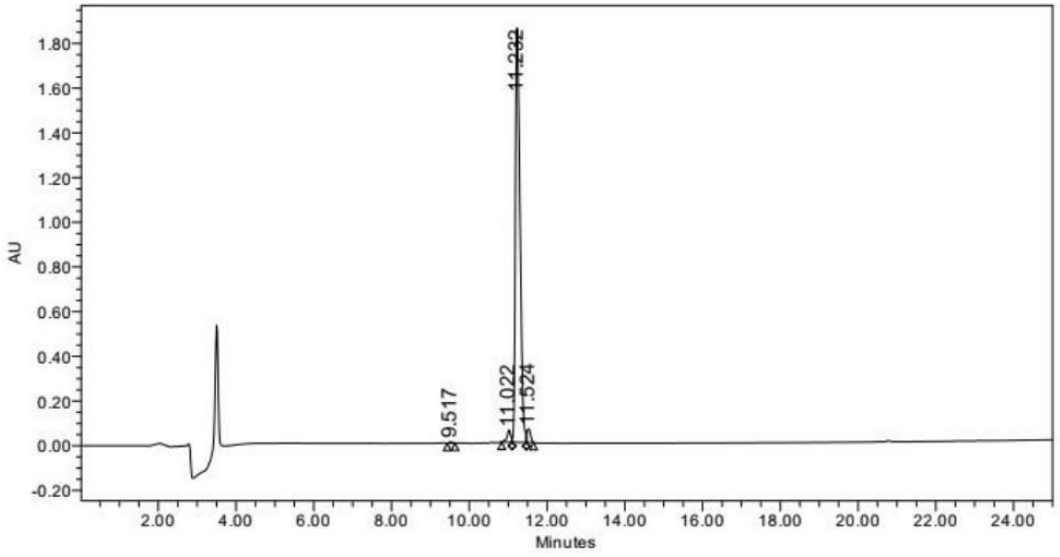
H-05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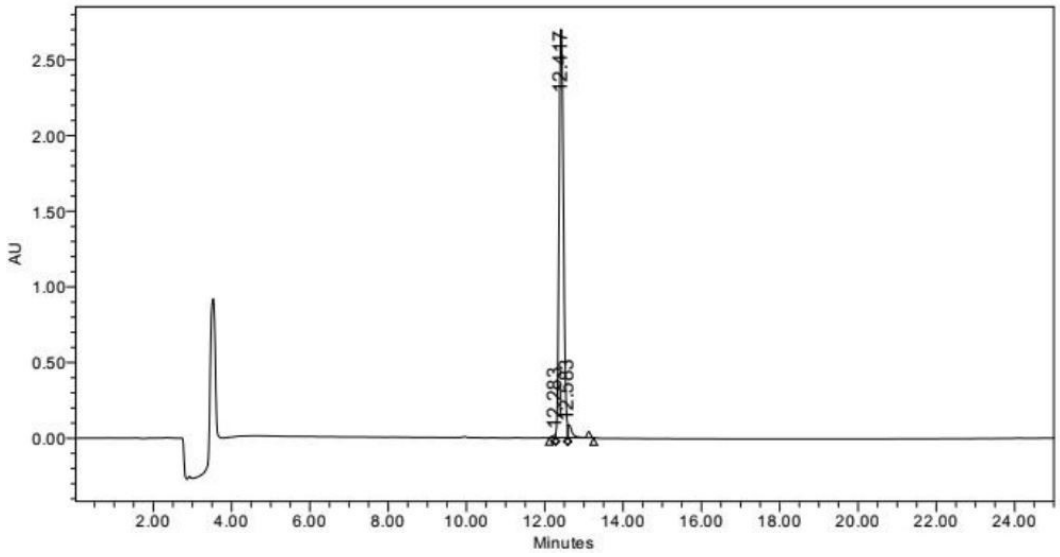
H-06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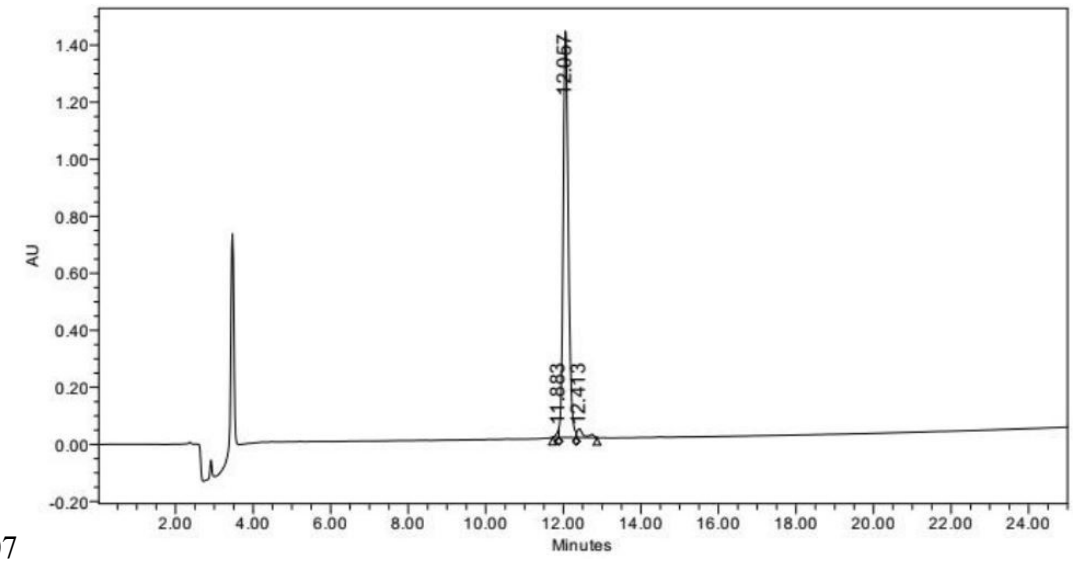

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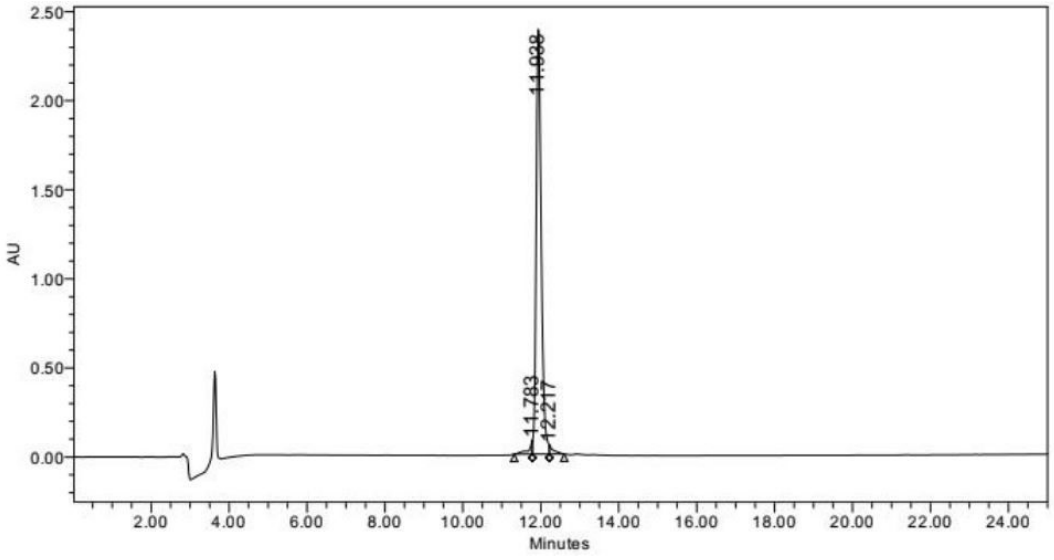
H-08



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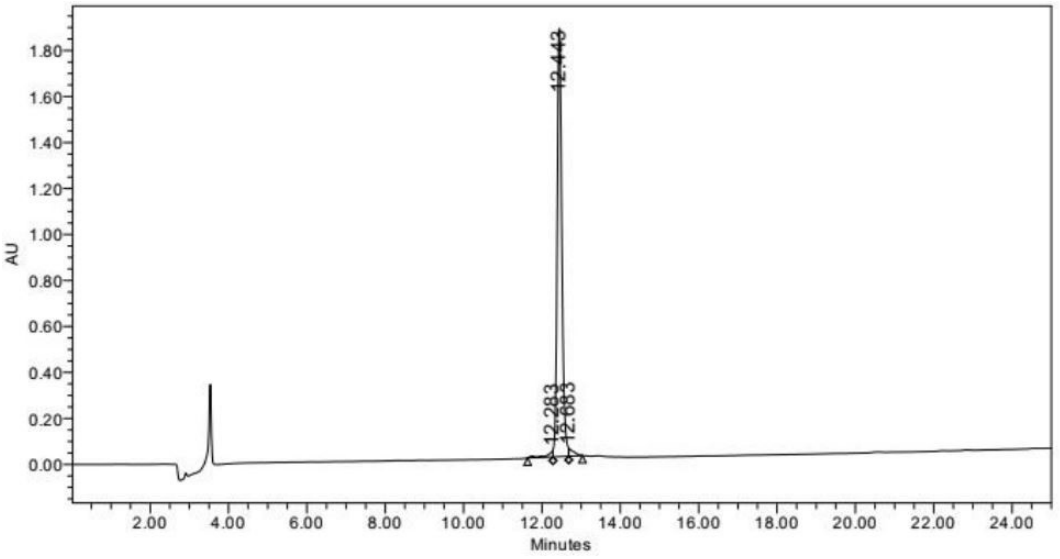

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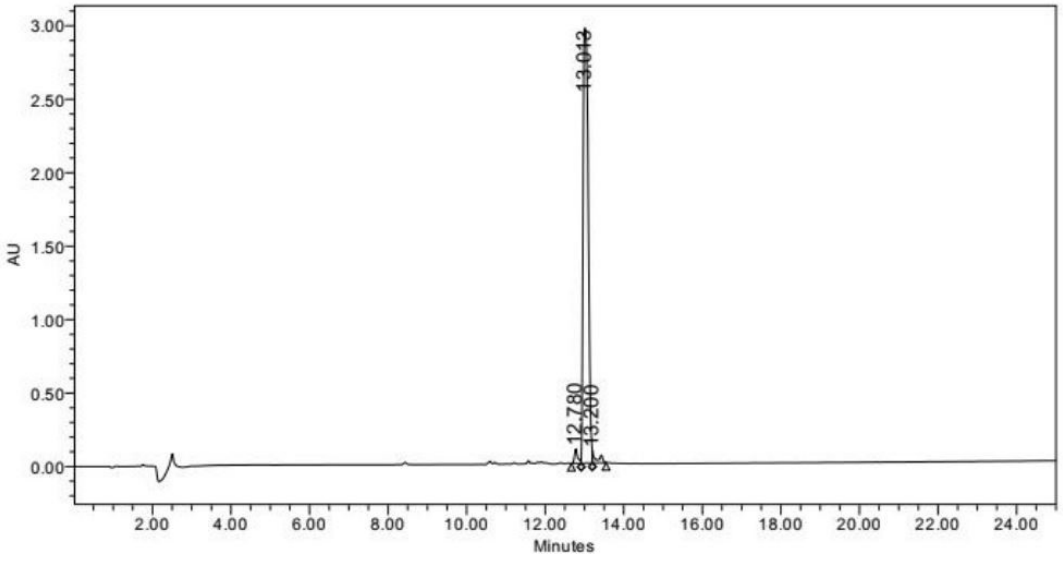
H-10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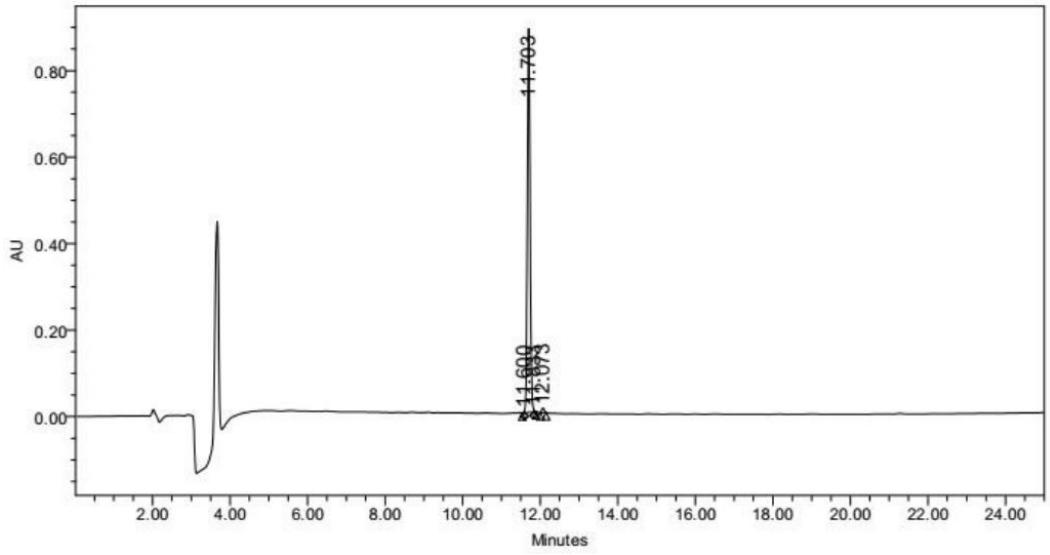
H-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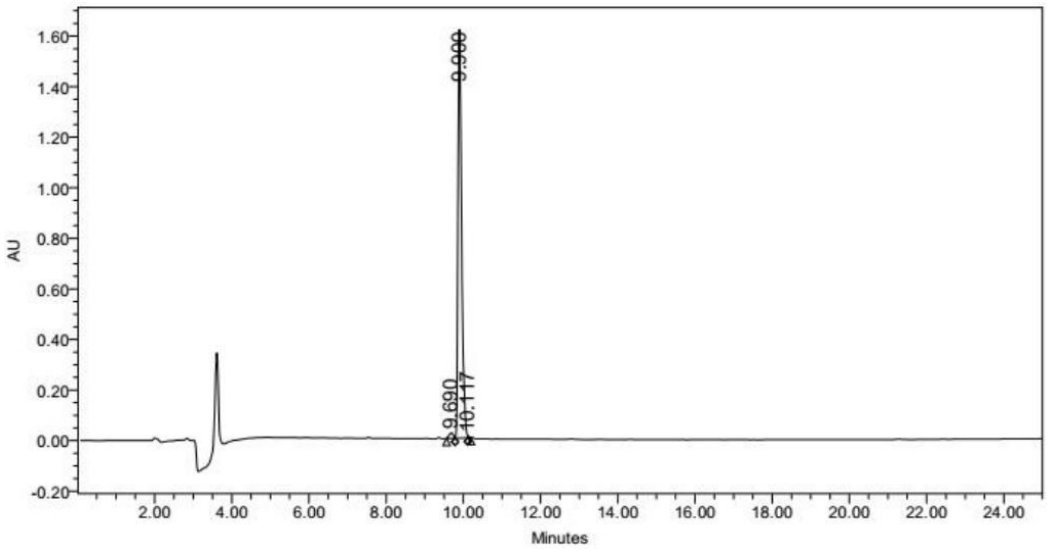
11.600
12.073

11

H-12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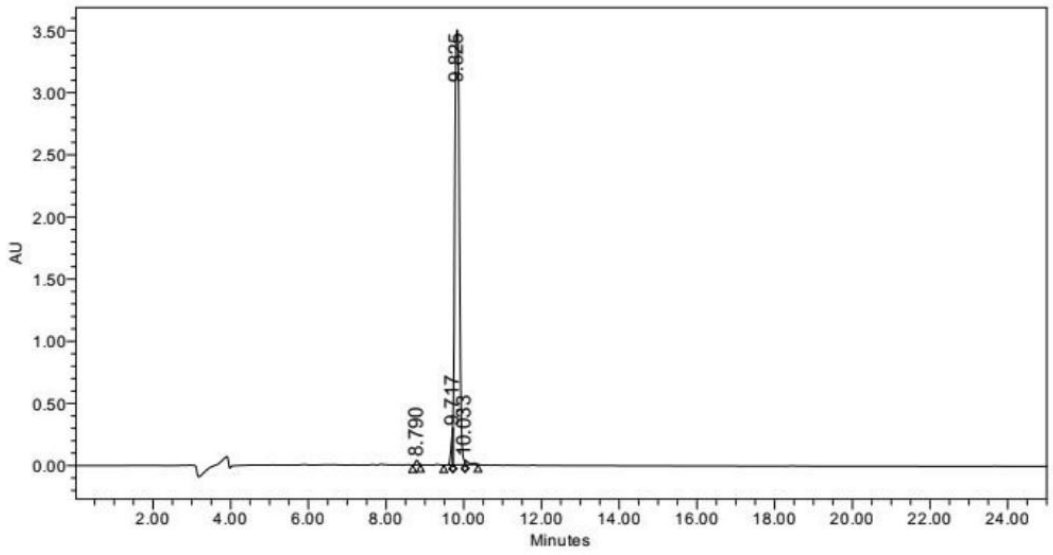
H-13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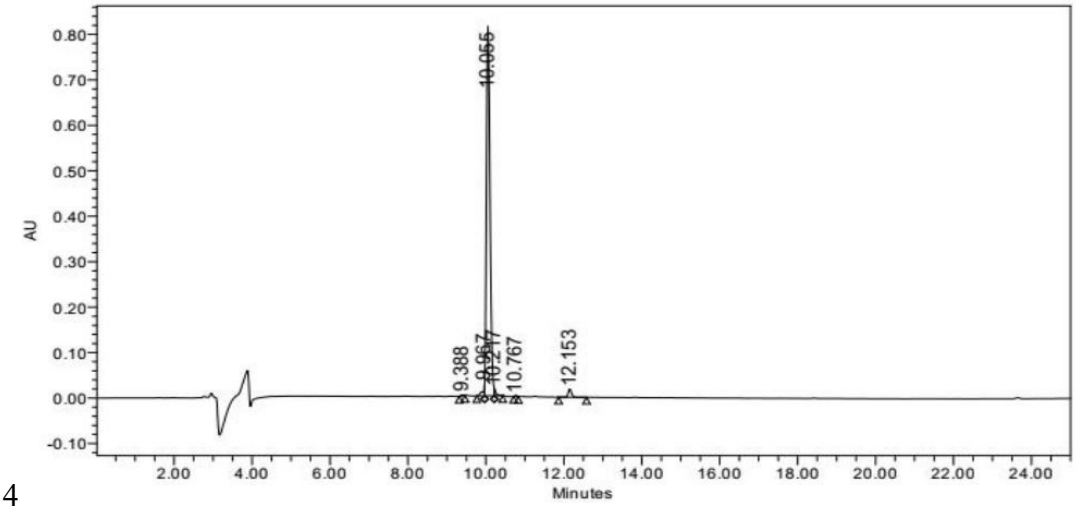
H-14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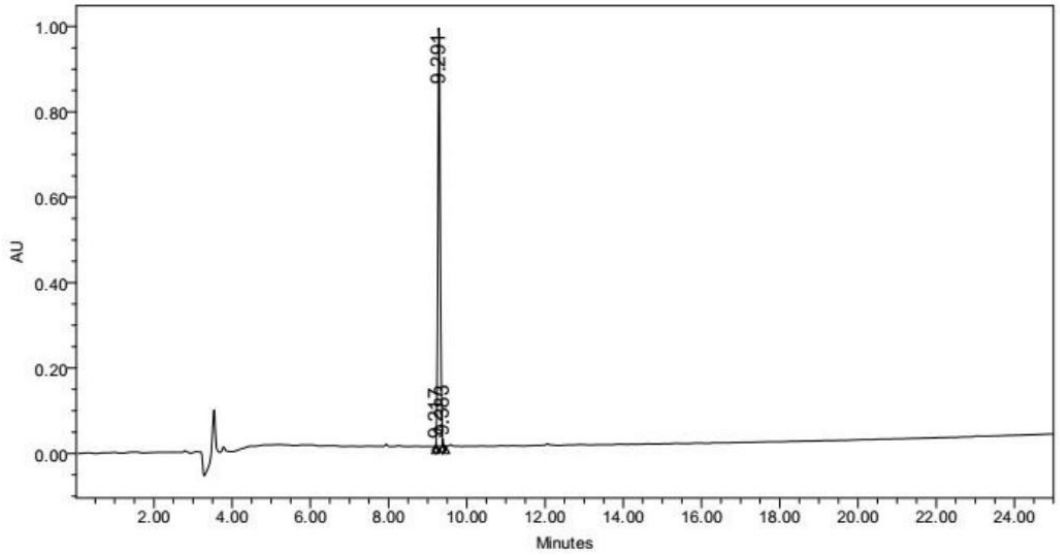
12.153

H-15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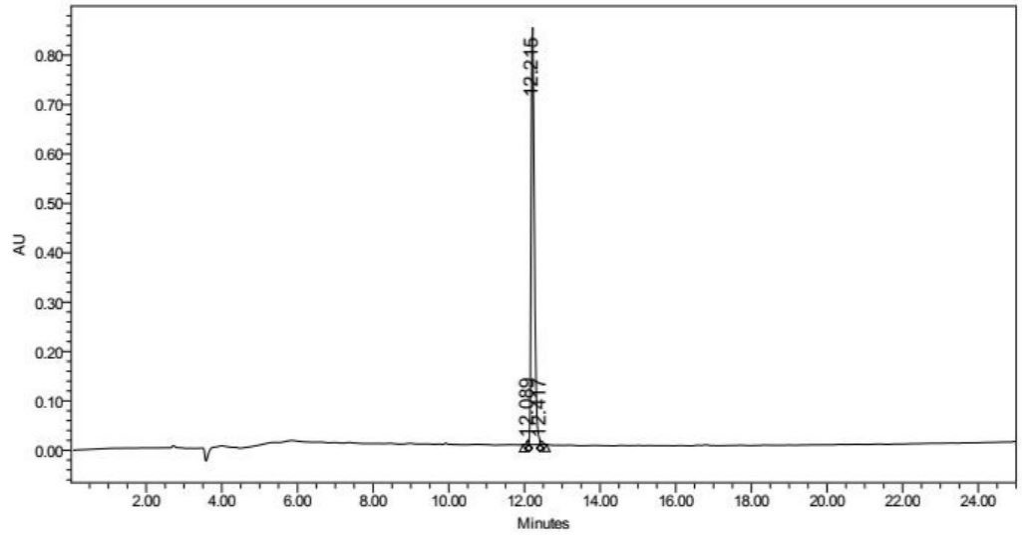
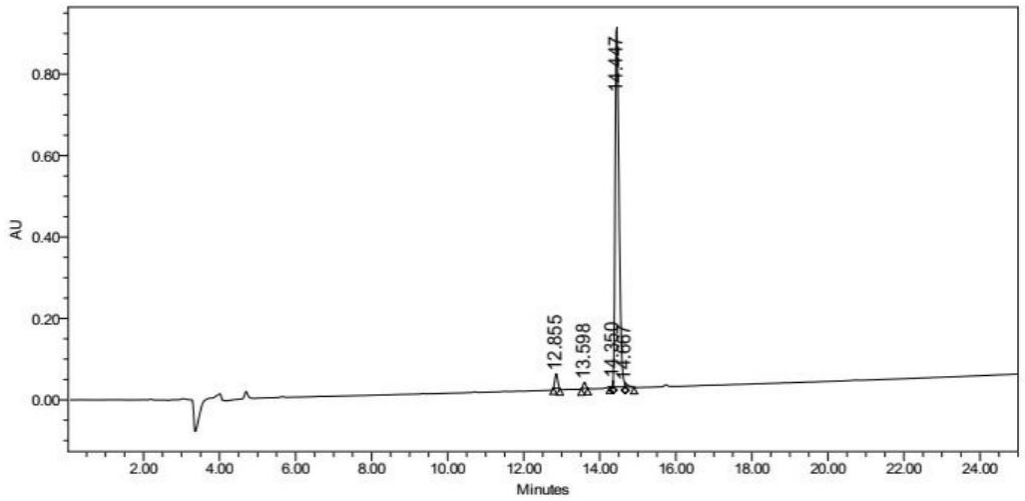
H-16



H-17



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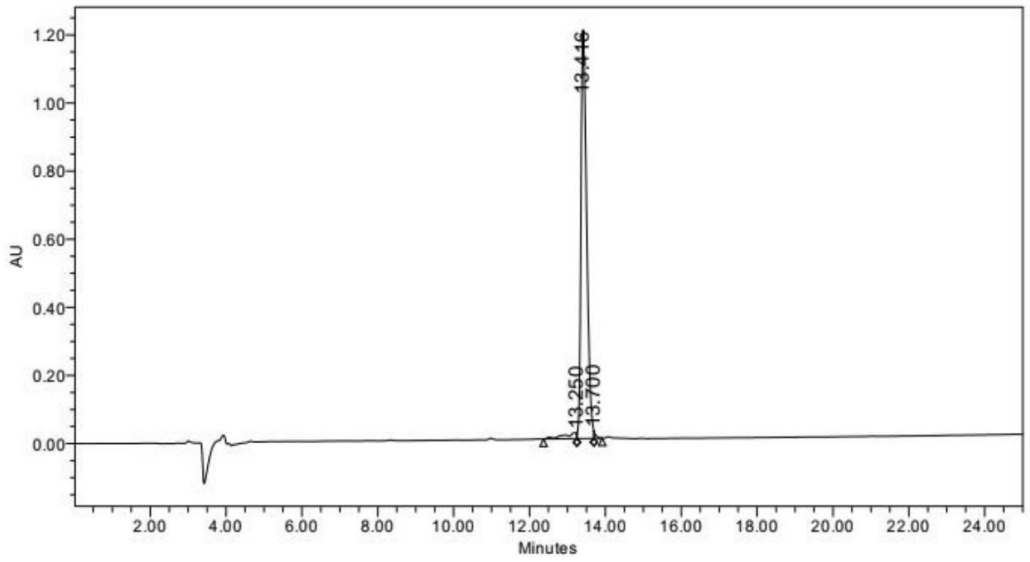
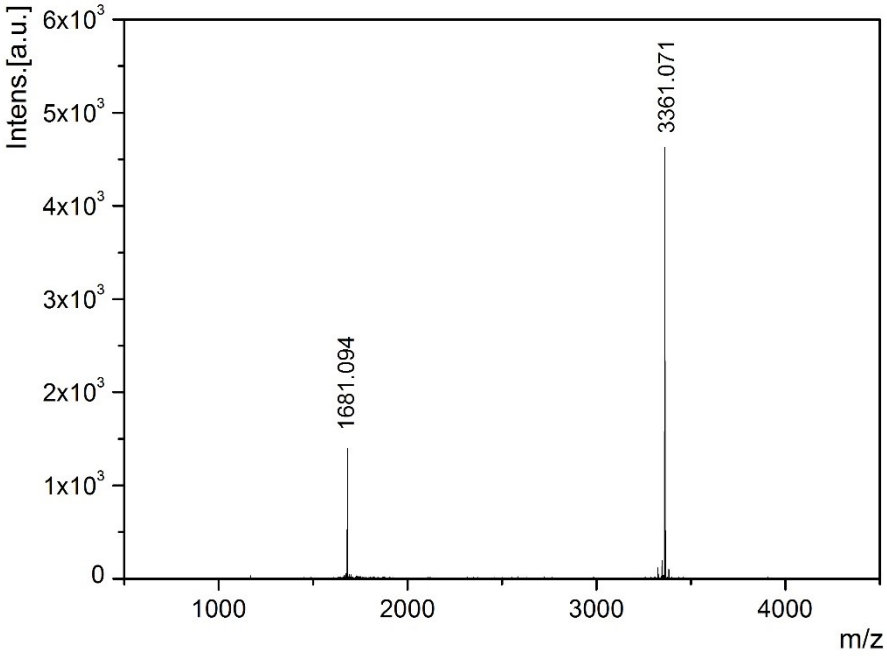


Figure S1. RP-HPLC of peptide vectors.

H-01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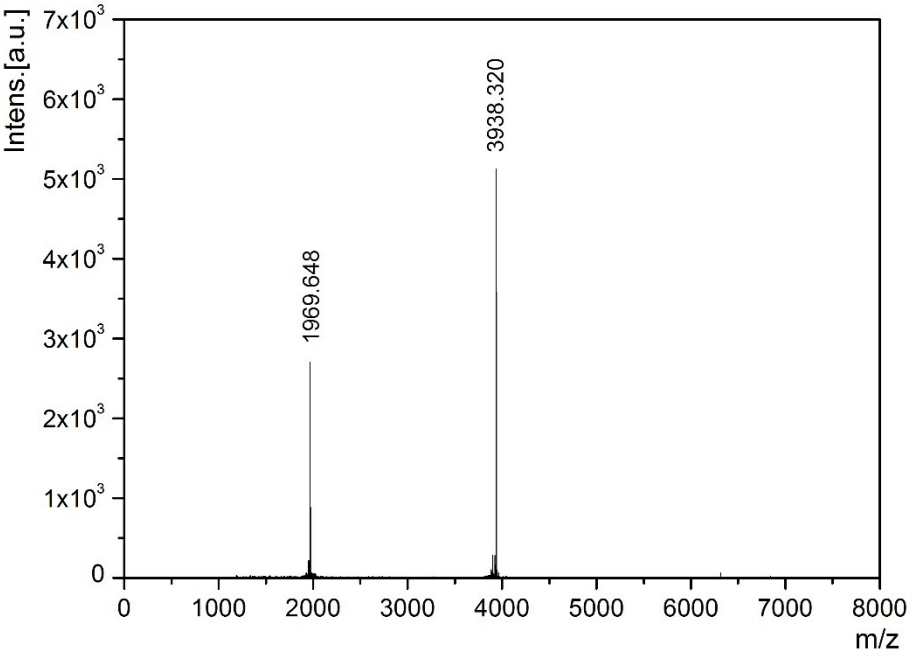
6x10^3
5x10^3
4x10^3
3x10^3
2x10^3
1x10^3
0
1681.094
3361.071
1000
2000
3000
4000
m/z

H-02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6x10^3
5x10^3
4x10^3
3x10^3
2x10^3
1x10^3
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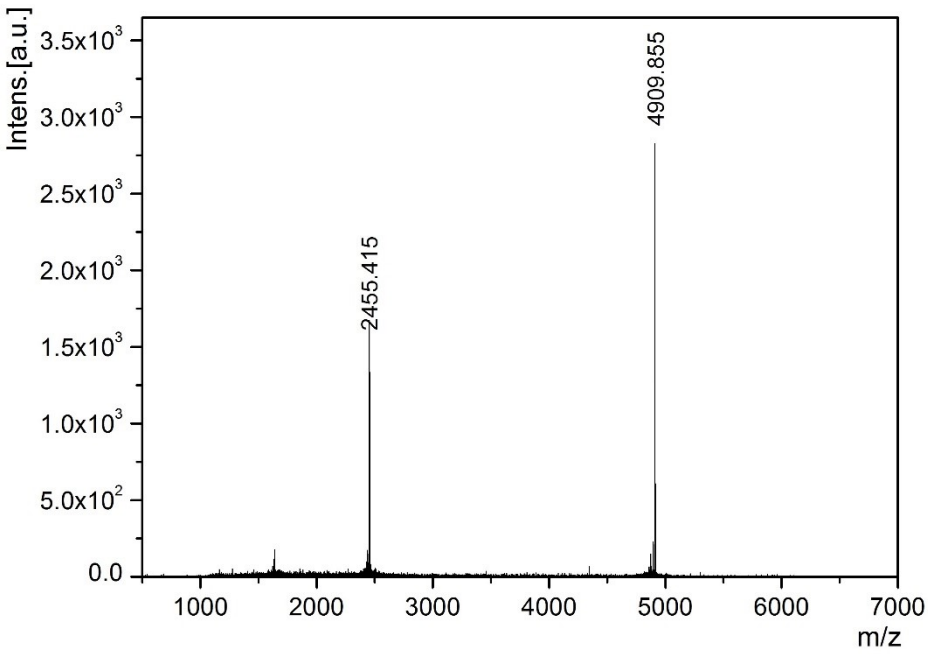
1969.648
3938.320
0
1000
2000
3000
4000
5000
6000
7000
8000
m/z

H-03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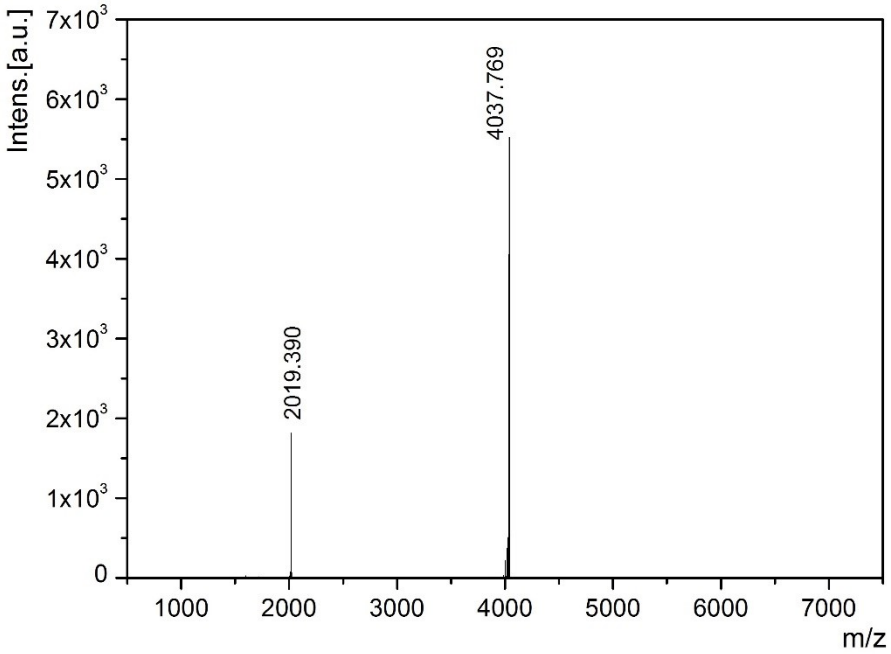
3.0x10³
2.5x10³
2.0x10³
1.5x10³
1.0x10³
5.0x10²
0.0
2455.415
4909.855
1000
2000
3000
4000
5000
6000
7000
m/z

H-04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6x10³
5x10³
4x10³
3x10³
2x10³
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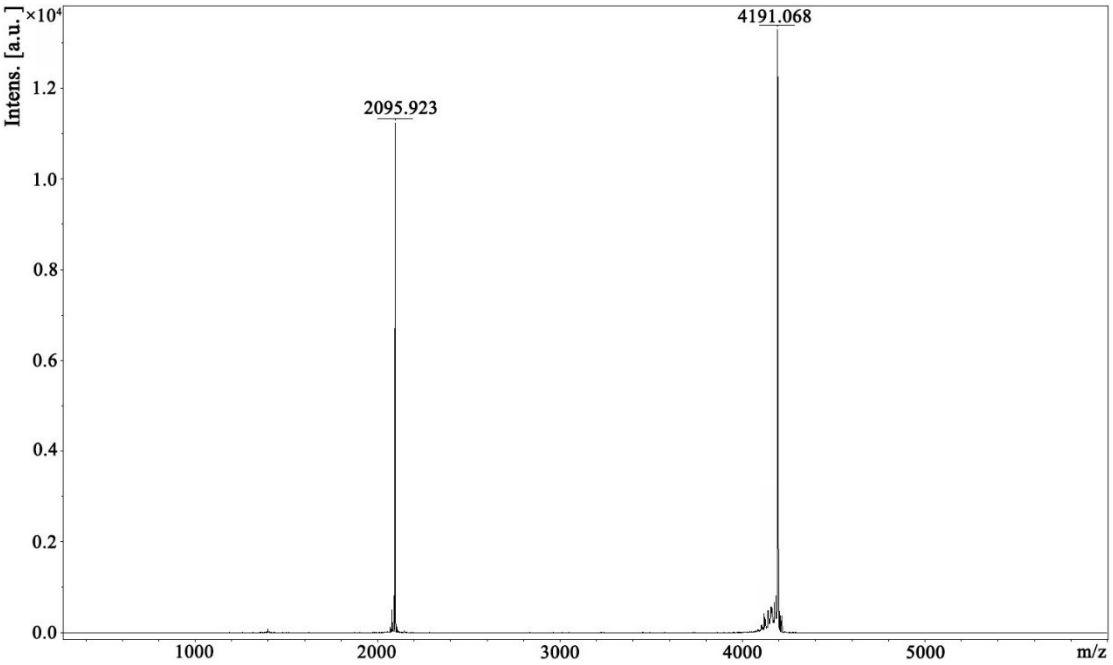
2000
3000
4000
5000
6000
7000
m/z

H-05


Intens. [a.u.]
×10⁴
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1.0
0.8
0.6
0.4
0.2
0.0
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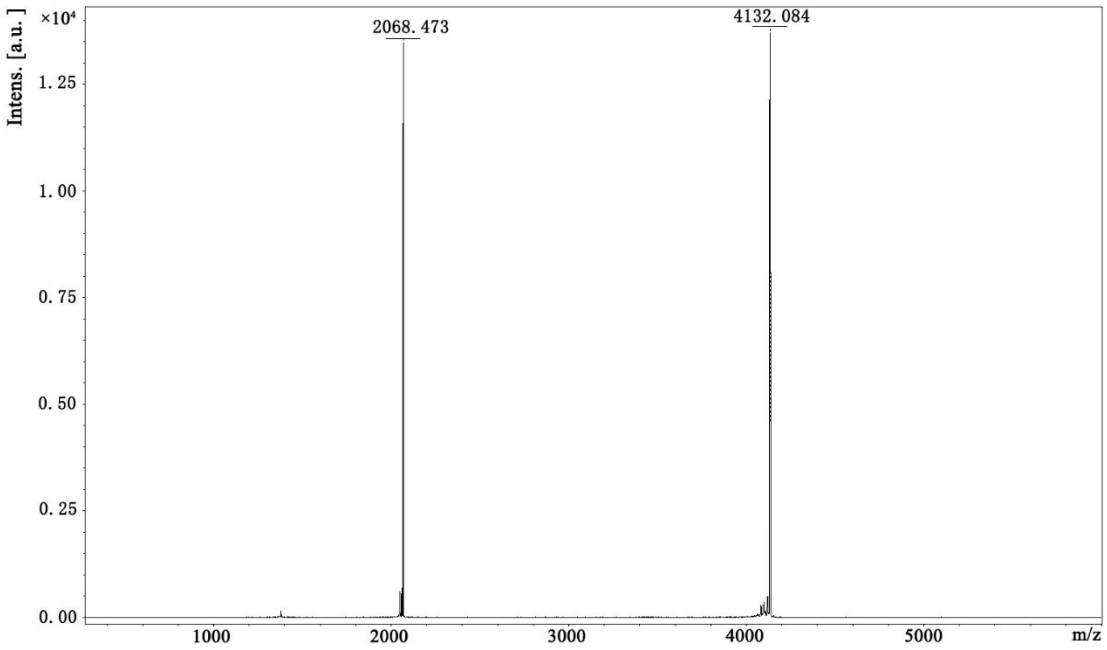
4191.068
1000
2000
3000
4000
5000
m/z

H-06


Intens. [a.u.]
×10⁴
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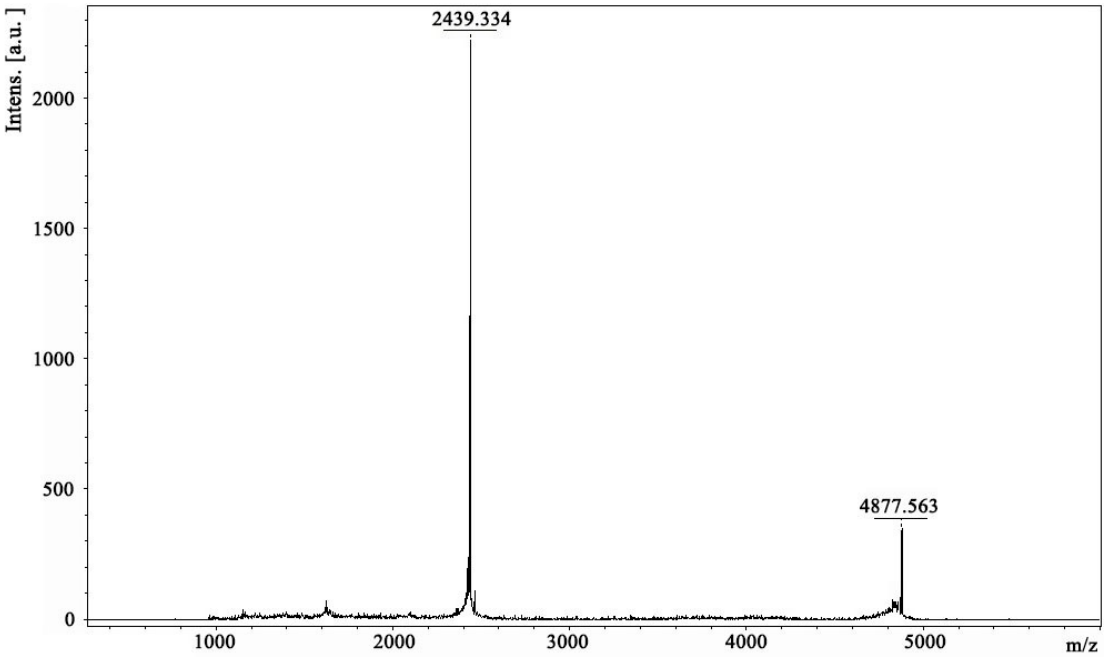
1.00
0.75
0.50
0.25
0.00
2068.473
4132.084
1000
2000
3000
4000
5000
m/z

H-07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1000
500
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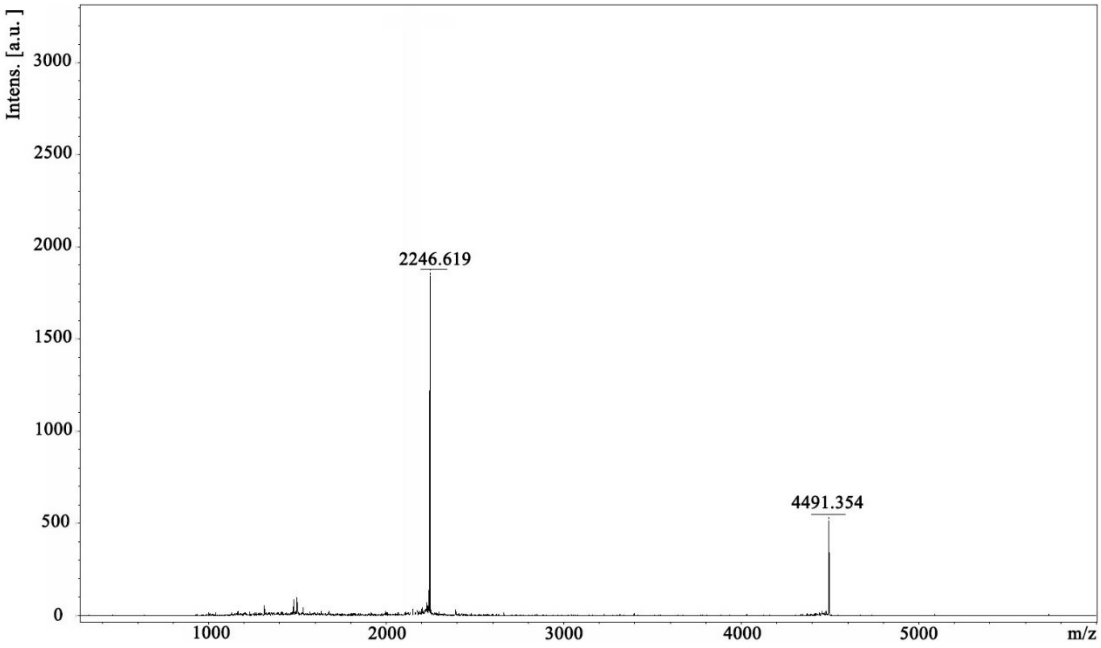
1000
2000
3000
4000
5000
m/z

H-08


Intens. [a.u.]
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2500
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1500
1000
500
0
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4491.354
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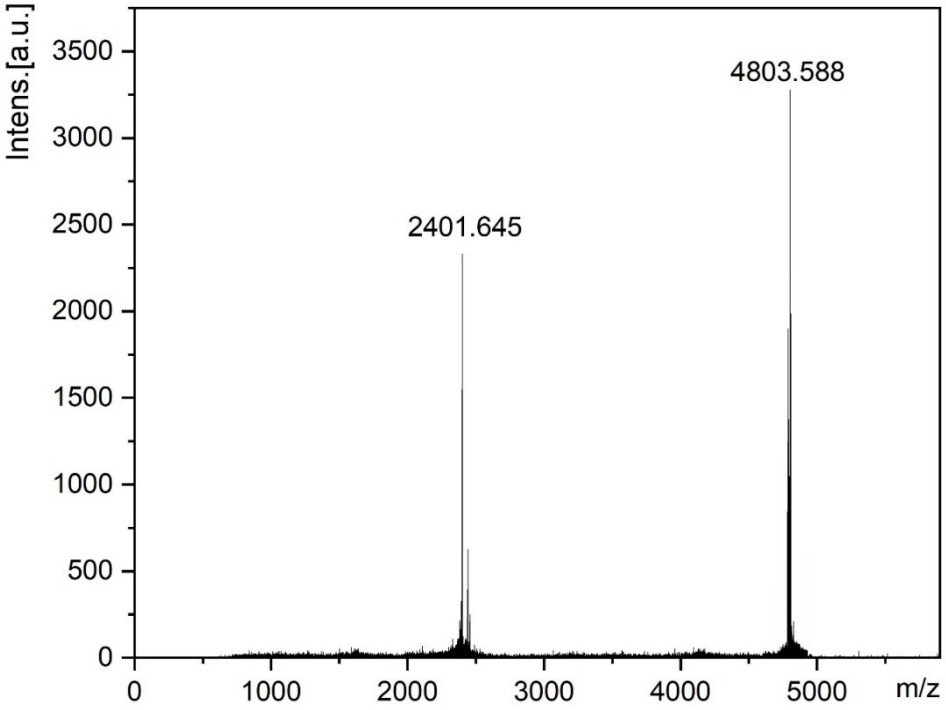
2000
3000
4000
5000
m/z

H-09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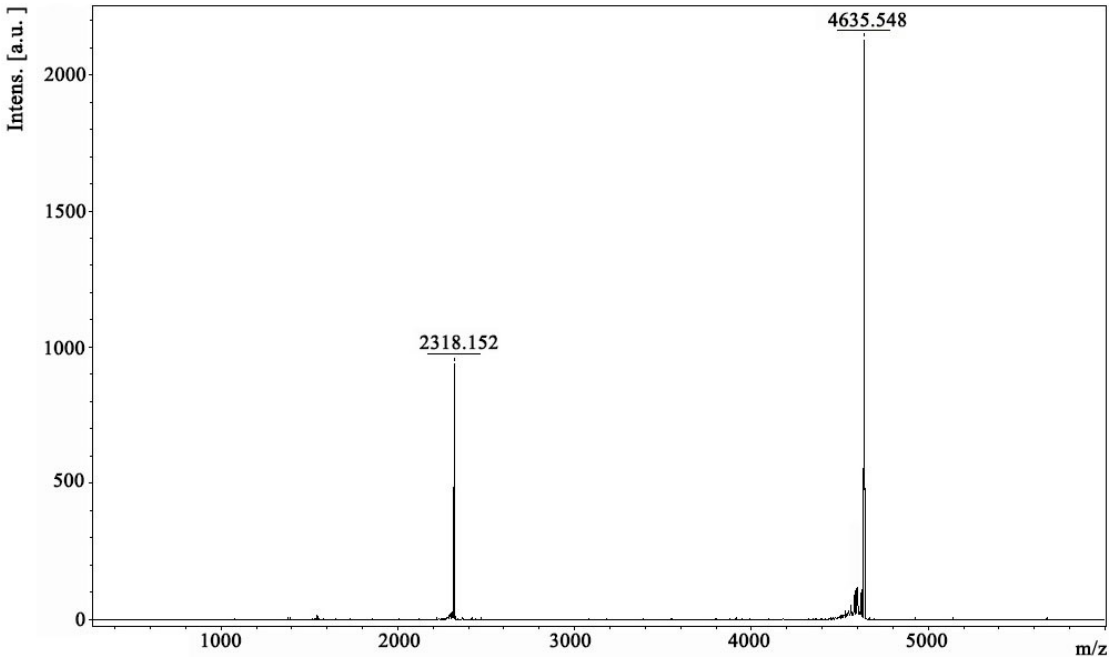
1000
2000
3000
4000
5000
m/z

H-10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0
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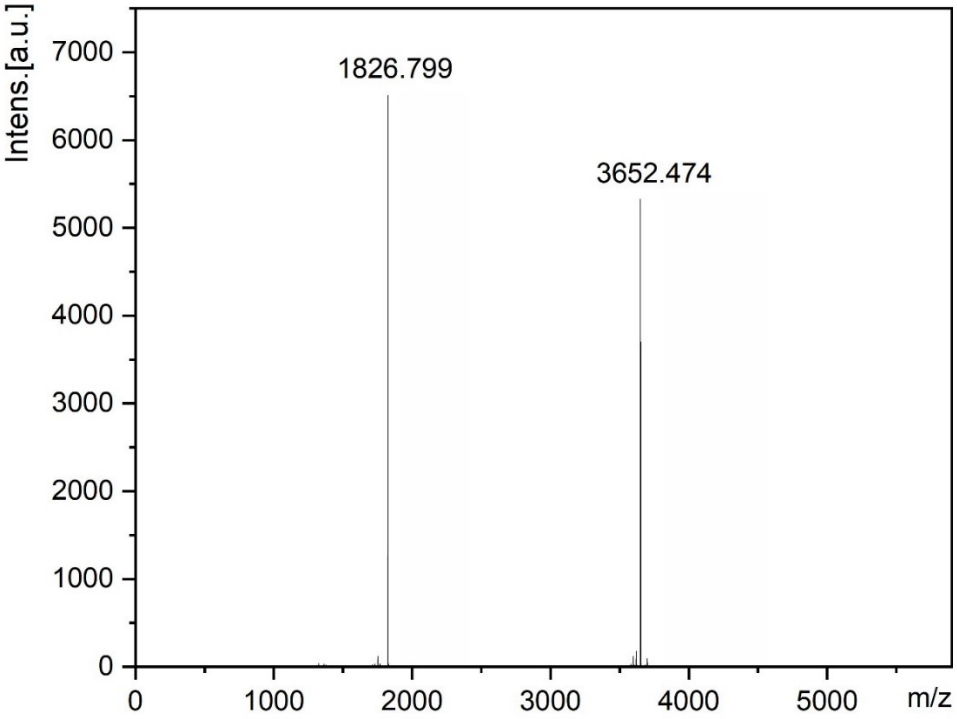
2318.152
1000
2000
3000
4000
5000
m/z

H-11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5000
4000
3000
2000
1000
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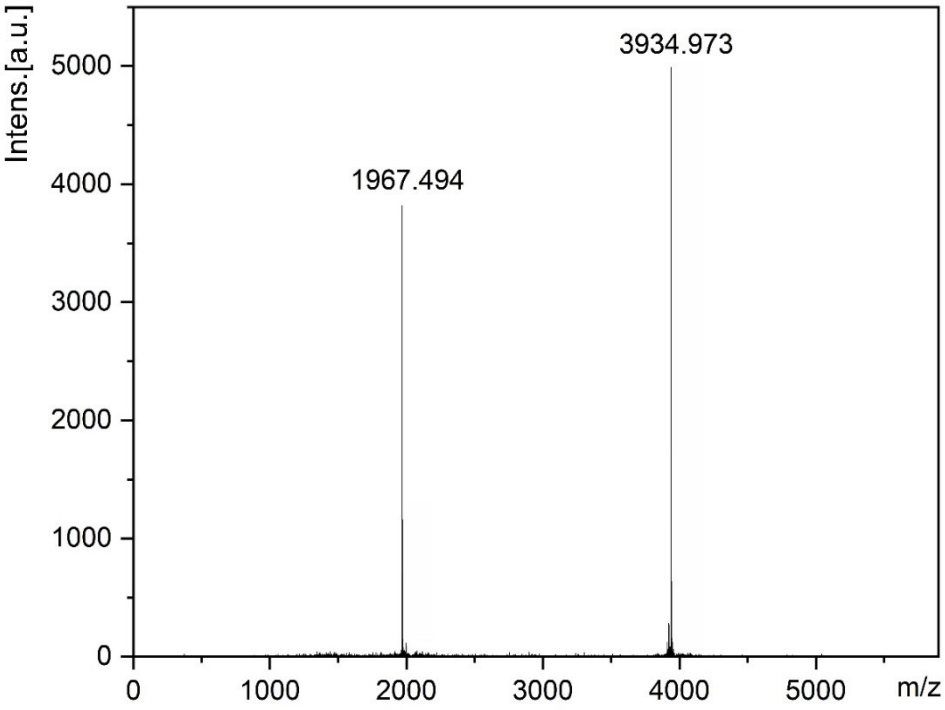
3652.474
0
1000
2000
3000
4000
5000
m/z

H-12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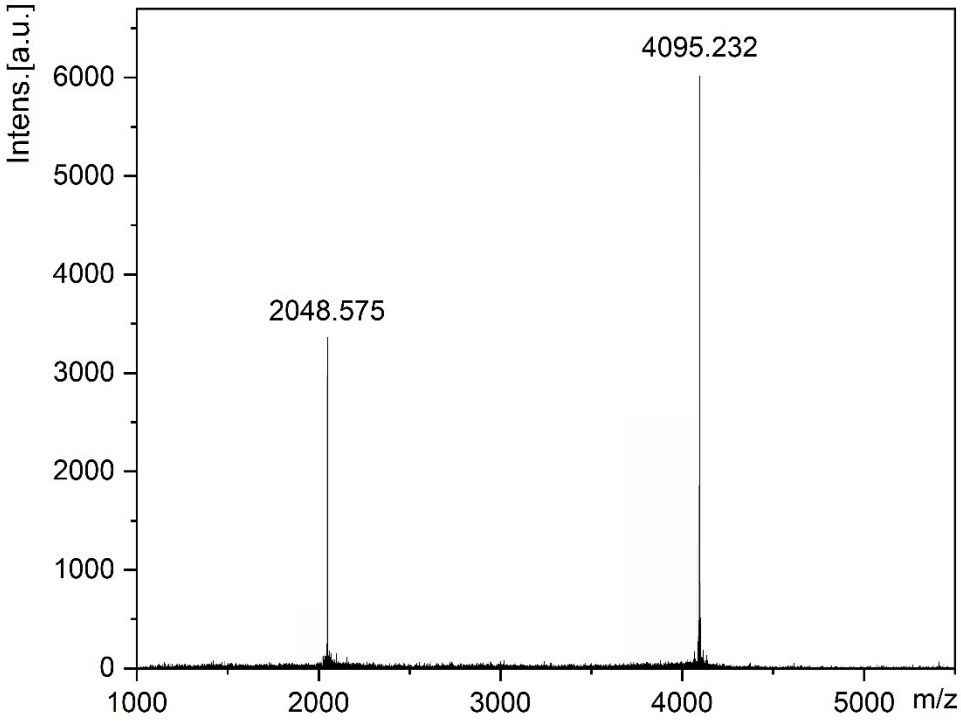
1000
2000
3000
4000
5000
m/z

H-13


Intens.[a.u.]
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1000
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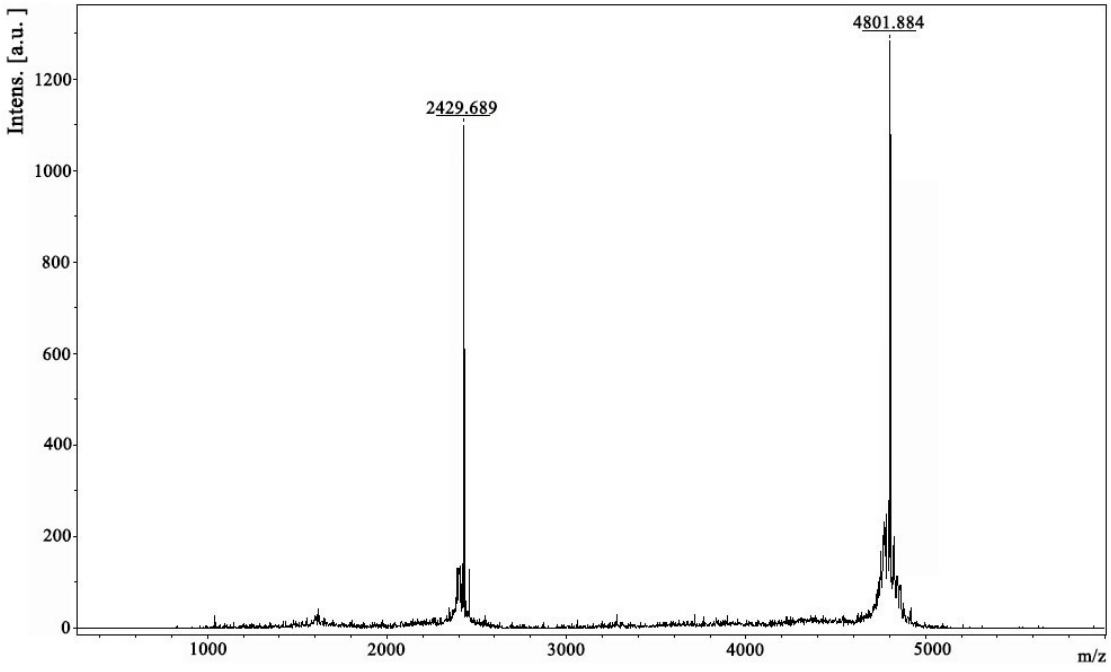
1000
2000
3000
4000
5000
m/z

H-14


Intens. [a.u.]
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1000
800
600
400
200
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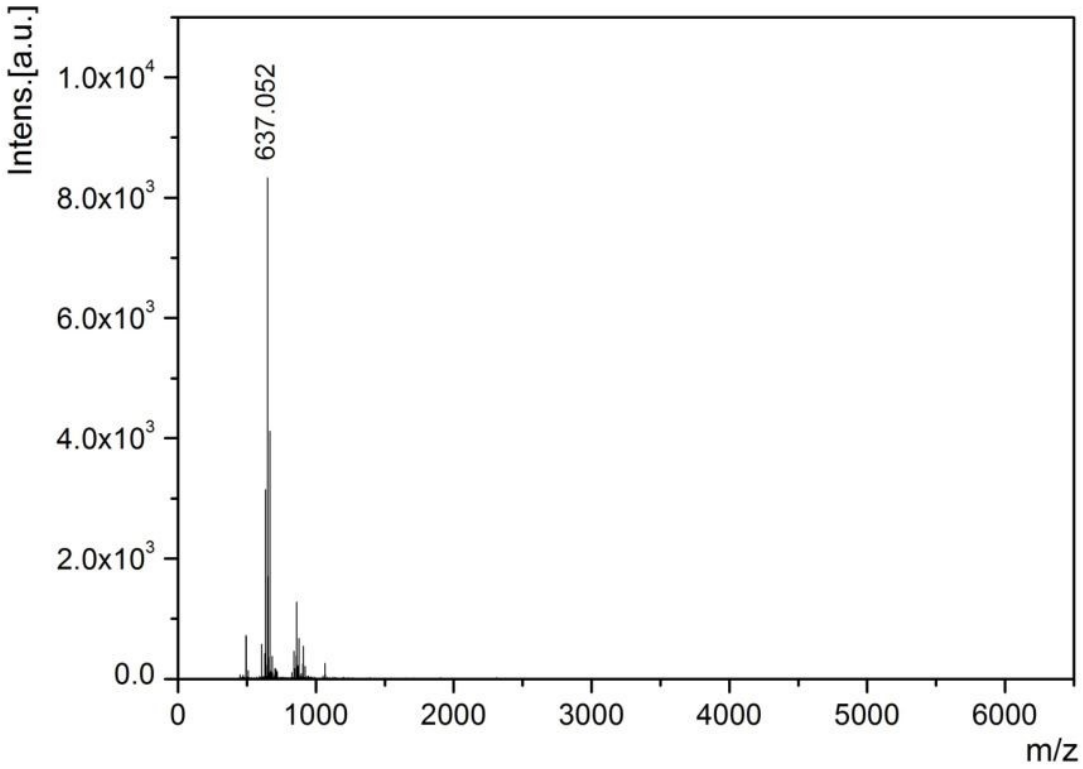
4801.884
2429.689
1000
2000
3000
4000
5000
m/z

H-15


Intens.[a.u.]
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8.0x10^3
6.0x10^3
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637.052
0
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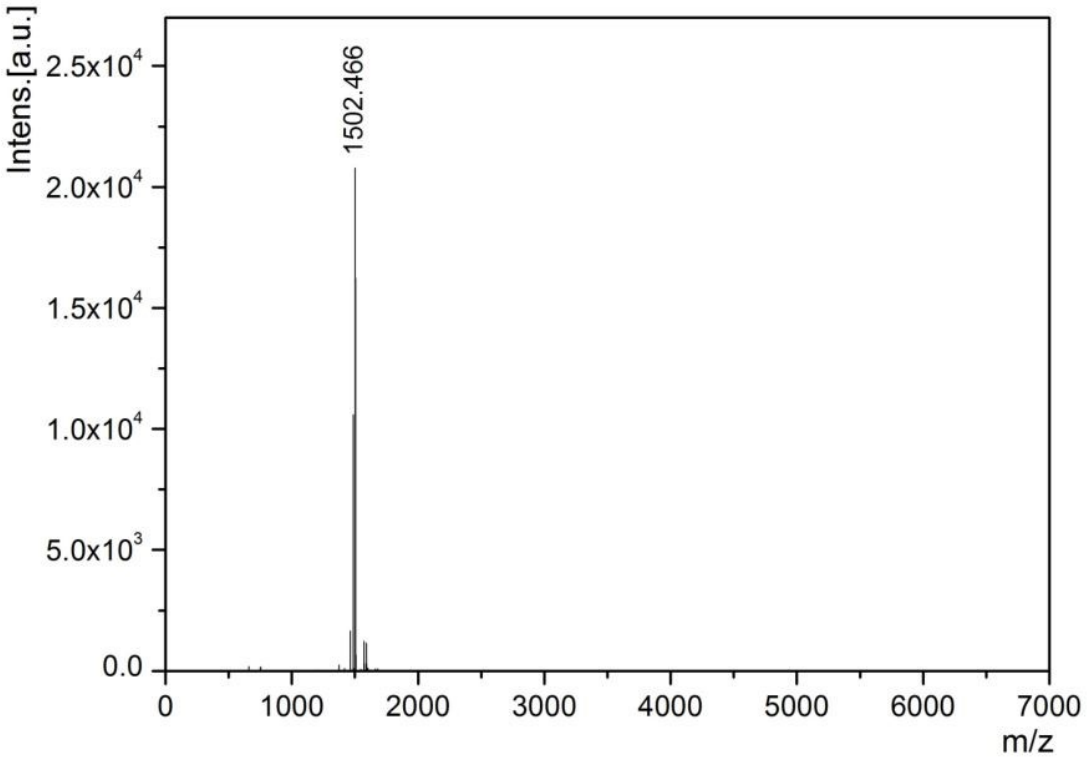
2000
3000
4000
5000
6000
m/z

H-16


Intens.[a.u.]
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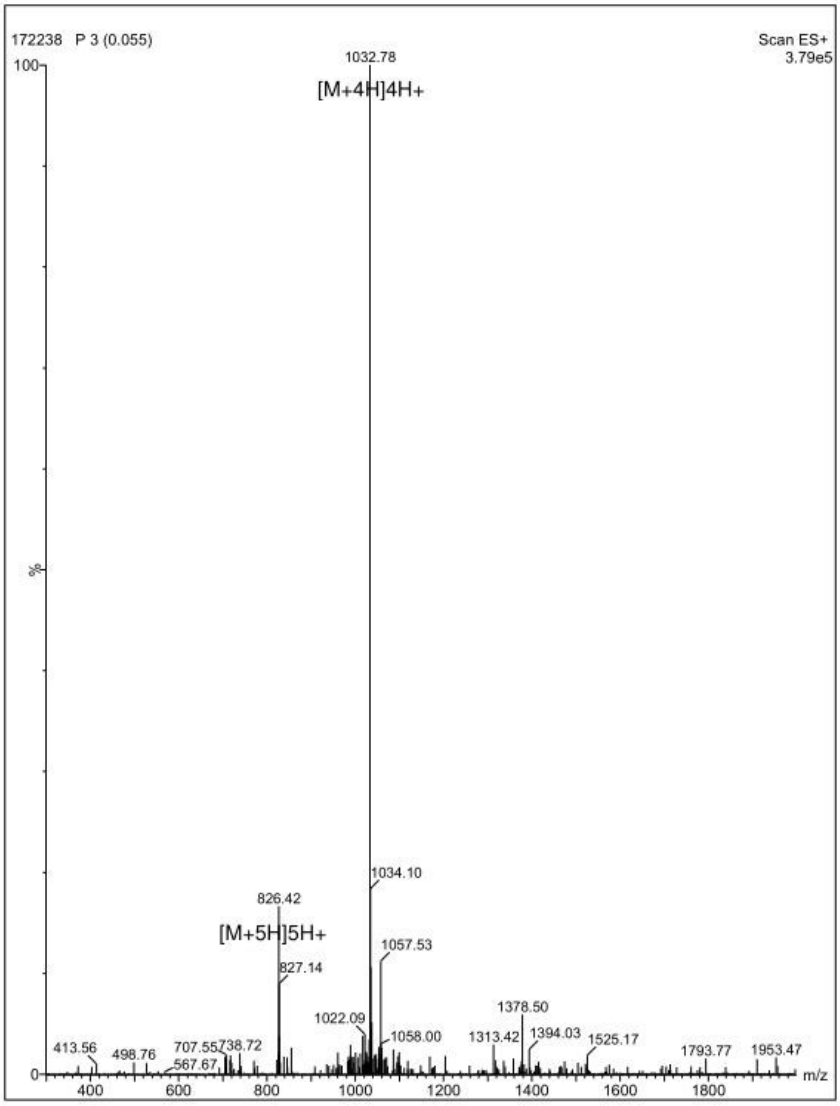
2.0x10^4
1.5x10^4
1.0x10^4
5.0x10^3
0.0
1502.466
0
1000
2000
3000
4000
5000
6000
7000
m/z

H-17


172238 P 3 (0.055)
Scan ES+
3.79e5
100
%
0
1032.78
[M+4H]4H+
826.42
[M+5H]5H+
827.14
1034.10
1057.53
1022.09
1058.00
1378.50
1313.42
1394.03
1525.17
1793.77
1953.47
413.56
498.76
707.55
738.72
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400
600
800
1000
1200
1400
1600
1800
m/z

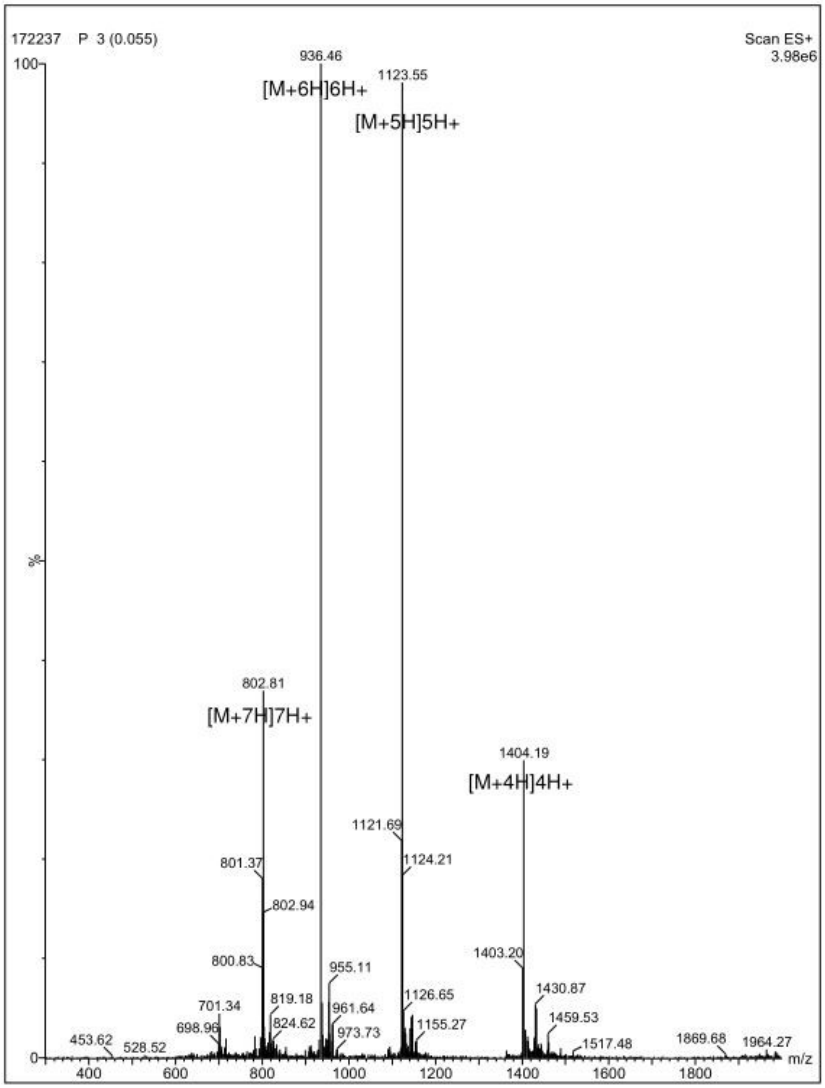

Figure S2. MALDI-TOF-MS or ESI-MS of peptide vectors.

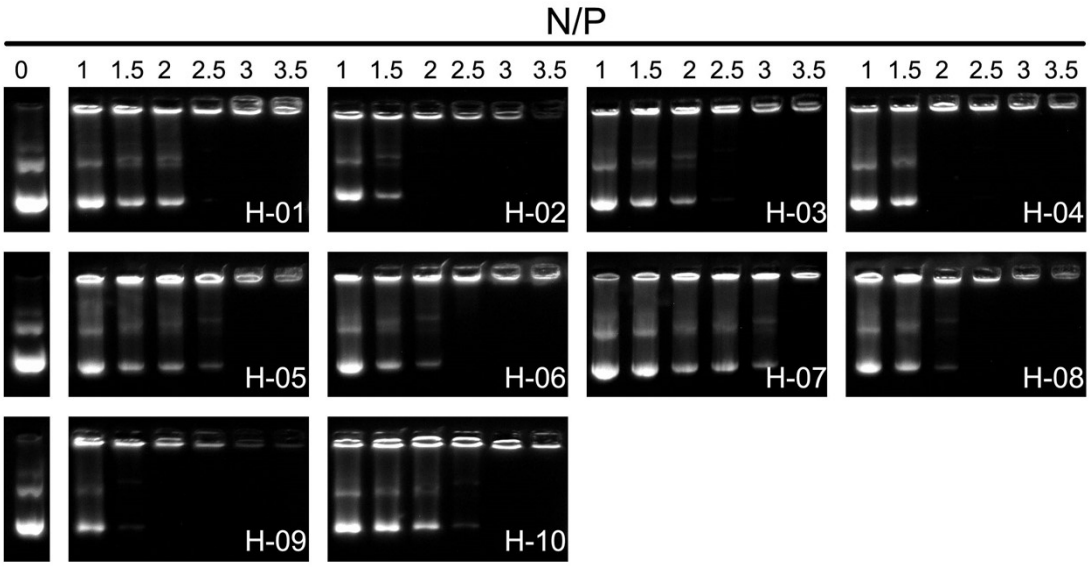

Figure S3. Agarose gel electrophoresis assays of peptide vectors at different N/P ratios.

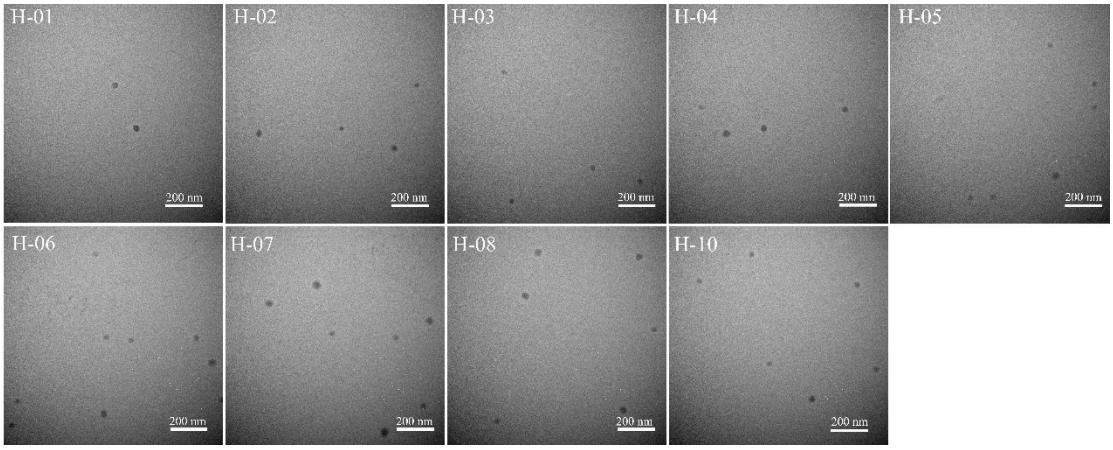

Figure S4. TEM images of peptide/DNA complexes at the N/P ratio of 10. The scale bar represents 200 nm.

Table S2. The concentrations of peptide/DNA complexes in the cytotoxicity analysis

Compounds	Concentrations (μM)				
	N/P				
	4	6	8	10	12
H-01	1.37	2.05	2.74	3.42	4.11
H-02	1.23	1.85	2.46	3.08	3.70
H-03	1.12	1.68	2.24	2.80	3.36
H-04	1.54	2.31	3.08	3.85	4.62
H-05	1.23	1.85	2.46	3.08	3.85
H-06	1.23	1.85	2.46	3.08	3.85
H-07	2.05	3.08	4.11	5.13	6.16
H-08	1.37	2.05	2.74	3.42	4.11
H-09	1.23	1.85	2.46	3.08	3.70
H-10	1.37	2.05	2.74	3.42	4.11

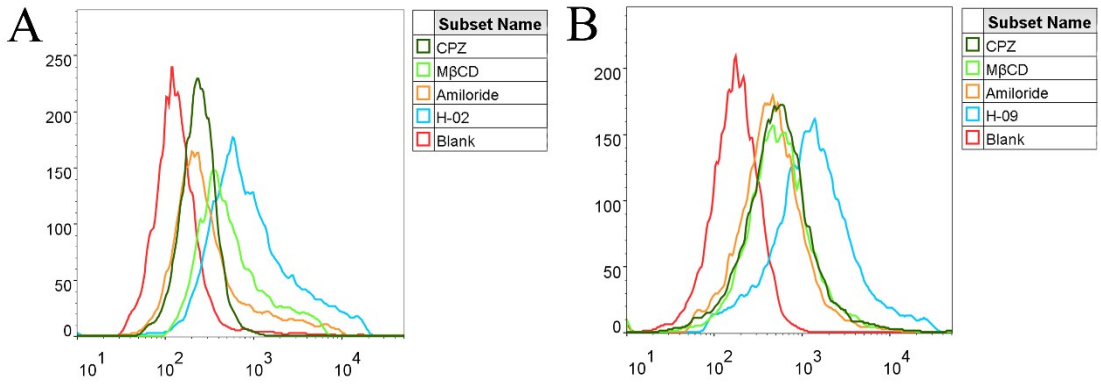

Figure S5. Flow cytometric analysis of cellular uptake mechanisms of H-02/DNA (A) and H-09/DNA (B) complexes in HepG2 cells using specific endocytosis inhibitors. The DNA was labeled with YOYO-1.

Table S3. The mean intensity of the green fluorescence in HepG2 and LO2 cells measured by ImageJ in CLSM analysis

Compounds	Mean intensity	
	HepG2	LO2
H-01	90.41	117.31
H-02	198.51	139.97
H-03	53.21	57.78
H-04	189.18	158.10
H-05	132.09	83.77
H-06	86.88	88.12
H-07	198.64	85.06
H-08	46.99	83.32
H-09	203.89	122.41
H-10	113.66	61.18
Lipo 2000	53.76	90.87

Table S4. The CLR of DAPI and YOYO-1 in live-cell imaging experiments

Time (min)	CLR (%)			
	H-01	H-02	H-09	Lipo 2000
5	7.33	10.27	16.64	-
15	18.44	20.71	20.72	10.40
60	21.99	47.22	29.94	26.27
120	22.57	49.11	60.56	48.15
240	-	-	-	83.64