Table S1 *Sn*-2 fatty acid composition of human milk fat (%)

Fatty acid	HMFS I	HMFS II	2018 Qi[23] Wuxi, China n=103			2013 Zou[24] Aarhus, Danish n=45	2002 Lopez[25] Spain n=40			2017 Kallio[26] n=10	
			Colostrum	Transitional	Mature	Mature	Colostrum	Transitional	Mature	Finland	China
C8:0	0.47	0.49	0.08	0.2	0.26	0.2	0	0	0	0.90	0.61
C10:0	0.46	0.44	0.45	0.78	0.96	0.79	0.21	0.29	0.36	4.30	4.56
C12:0	6.50	7.26	3.24	5.45	7.64	6.26	2.41	4.61	4.81	13.84	11.73
C14:0	20.89	18.55	7.46	10.97	11.53	13.08	6.69	10.74	9.66	16.64	10.77
C15:0	0.57	0.54	0.45	0.39	0.43	0	0.51	0.46	0.53	0.00	0.00
C16:0 n-7	49.32	43.48	51.63	50.55	50.35	52.66	52.23	51.17	52.3	42.83	43.20
C17:0	0.66	0.58	0.37	0.38	0.38	0	0.38	0.37	0.37	0.00	0.01
C18:0	4.32	5.26	2.03	1.8	1.83	1.72	1.68	1.8	1.71	3.78	3.08
C16:1	3.09	2.74	2.17	1.95	2.04	1.91	1.97	1.72	1.88	3.10	3.60
C17:1	1.45	1.69	0.07	0.06	0.06	0	0	0	0	0.00	0.00
C18:1 n-9	6.07	10.64	14.2	11.67	10.44	9.99	17.43	14.41	13.97	6.79	8.94
C18:2 n-6	5.30	7.18	9.24	8.26	7.59	6.85	11.58	10.32	10.95	4.24	11.40
ARA	0	0	1.01	0.79	0.68	0.42	1.16	0.88	0.67	0.00	0.00
18:3 n-3	0.65	0.77	0.51	0.83	0.89	0.5	0.28	0.41	0.59	1.09	0.52
EPA	0	0	0.13	0.07	0.08	0.29	0	0	0	0	0
DHA	0	0	1.17	1.07	0.86	0.65	0.93	0.81	0.64	0	0

Table S2 Fatty acid composition range of human milk fat in different region (%)

Fatty acid	North America[27-28]		Asia[23,28-30]		Europe[24-25,28, 31-33]		Latin America[28,34-35]	
	max	min	max	min	max	min	max	min
C8:0	0.2	0.01	0.668	0	0.62	0.02	0.35	0
C10:0	1.98	0.8	2.41	0.8	4.96	0.36	2.17	0.81
C12:0	7.69	3.67	14.29	2.056	9.35	4.05	9.67	4.09
C14:0	7.83	4.37	12.51	1.764	11.37	3.6	10.09	3.95
C15:0	0.49	0.25	0.58	0	0.48	0	0.46	0.1
C16:0	20.55	16.05	25.06	14.638	28.967	15.43	21.01	15.06
C17:0	0.44	0.2	0.46	0	0.44	0	0.43	0
C18:0	7.12	5.18	7.51	3.445	8.13	4.248	10.77	4.17
C16:1 n-7	2.91	1.71	4.74	1.11	3.02	0.29	3.46	1.25
C17:1	0.29	0.15	0.39	0.06	0.34	0	0.28	0
C18:1 n-9	35.88	29.44	41.489	21.34	42.2	24.45	35.09	21.54
C18:2 n-6	15.17	7.85	33.65	7.66	28.51	5.61	26.78	13.82
C18:3 n-3	1.53	0	3.383	0	0.887	0	0.65	0.06
ARA n-6	0.46	0.07	0.97	0.09	0.75	0.181	0.67	0.39
EPA n-3	0.08	0.07	0.9	0.05	0.24	0	0.1	0
DHA n-3	0.24	0.04	1.07	0.33	0.74	0.021	0.46	0.09

Table S3 TAG species identified in human milk fat (%)

TAG species	2019 Yuan[40] Wuxi, China HPLC-APCI-MS n=103		2019 Zhang[41] Wuxi, China UPC2 Q-TOF-MS n=3		2019 Zhao[30] Beijing, China SFC-API-MS n=26		2016 Tu[42] China UPC2 Q-TOF MS n=27		2015 Doménech[43] Valencia, Spain HPLC-APCI-MS n=7		2013 Zou[24] Aarhus, Denmark Ag-HPLC n=45		2012 Haddad[33] Marche, Italy HPLC-ESI-MS n=8	
	max	min	max	min	max	min	max	min	max	min	max	min	max	min
OPL	28.29	21.67	19.35	12.6	14.391	7.003	9.64	5.46	10.09	9.67	21.25	12.69	4.049	2.037
OPO	17.95	9.87	19.44	10.38	20.173	9.753	6.35	2.77	20.9	19.7	28.46	13.69	17.847	9.327
LPL	9.05	2.35	8.96	3.86	9.429	1.34	5.52	3.54	1.03	0.89			8.832	5.302
PSO	2.15	0.73	3.46	2.05	5.17	1.303	4.06	1.8	5.19	4.93	3.08	1.65	3.622	2.496
MOL	9.44	2.68	2.67	2.23	2.371	0.737	3.55	2.62	2.83	2.71			1.931	1.065
PPoO/MOO	0	0	3.71	1.71	7.474	1.907	2.69	1.22	5.426	5.394			9.458	5.44
OOO	2.13	1.35	3.93	1.84	16.976	4.135	2.82	1.37	3.71	3.59	3.75	1.14	1.674	0.364
OOL	0	0	9.59	6.63	12.445	4.049	5.02	2.39	2.79	2.71			0.566	0.256
PPO/MSO	5.44	2.66	4.33	2.79	9.098	2.406	4.42	1.93	4.16	4.02	8.27	4.79	11.753	7.827
MPO	2.28	1.28	1.4	0.71	3.781	0.597	3.87	2.46	4.34	4.2			6.795	5.381
OLL	9.36	5.22	9.33	4.52	9.36	0.792	5.31	3.19	2.07	1.83			0.529	0.207
PODHA	0	0	0.5	0.44					0	0			0	0
MLL	0	0	0.49	0	1.986	0.154			0.241	0.223			0	0
MPL	0	0	0.58	0.45	2.149	0.333	2.78	1.96	1.34	1.24	3.97	0.73	1.966	1.724
LLL	2.59	0.87	2.84	0.51	6.843	0.177	2.14	0.85	0	0			1.073	0.169
SOO	1.05	0.03	0.94	0.18	5.287	0.748			1.52	1.44			0.862	0.386
PLLn/HdOL	0	0	0.76	0.38	0.894	0.066			0.248	0.238			0	0
POEPA	0	0							0	0			0	0
LaOL	6.56	2.64	2.15	0.95	2.129	0.391	4.04	1.74	2.13	2.05	2.65	1.21	1.475	0.919
LaPO/MMO	9.01	5.45	4.04	2.18	5.852	0.929	4.9	3.32	7.53	7.25	13.52	5.8	8.429	7.727

Table S4 Crystallization and melting parameters of HMFS

Crystallization		HMFS Ⅴ	HMFS Ⅵ
peak1	Tp ℃	0.24±0.17	-1.56±0.49
	Enthalpy J/g	19.28±2.79	3.76±0.34
peak2	Tp ℃	-	-23.21±0.53
	Enthalpy J/g	-	5.89±0.69
peak3	Tp ℃	-49.29±0.20	-38.23±3.35
	Enthalpy J/g	26.38±0.52	76.75±1.45
Melting			
peak 4	Tp ℃	-3.35±0.11	-0.53±0.02
	Enthalpy J/g	-34.39±1.25	-105.87±0.15
peak 5	Tp ℃	4.86±0.13	-
	Enthalpy J/g	-3.93±0.11	-
peak 6	Tp ℃	16.03±0.07	15.01±0.07
	Enthalpy J/g	-4.03±0.22	-2.27±0.71

Tp, peak temperature.

Figure S1 HPLC chromatographs of HMFS Ⅴ

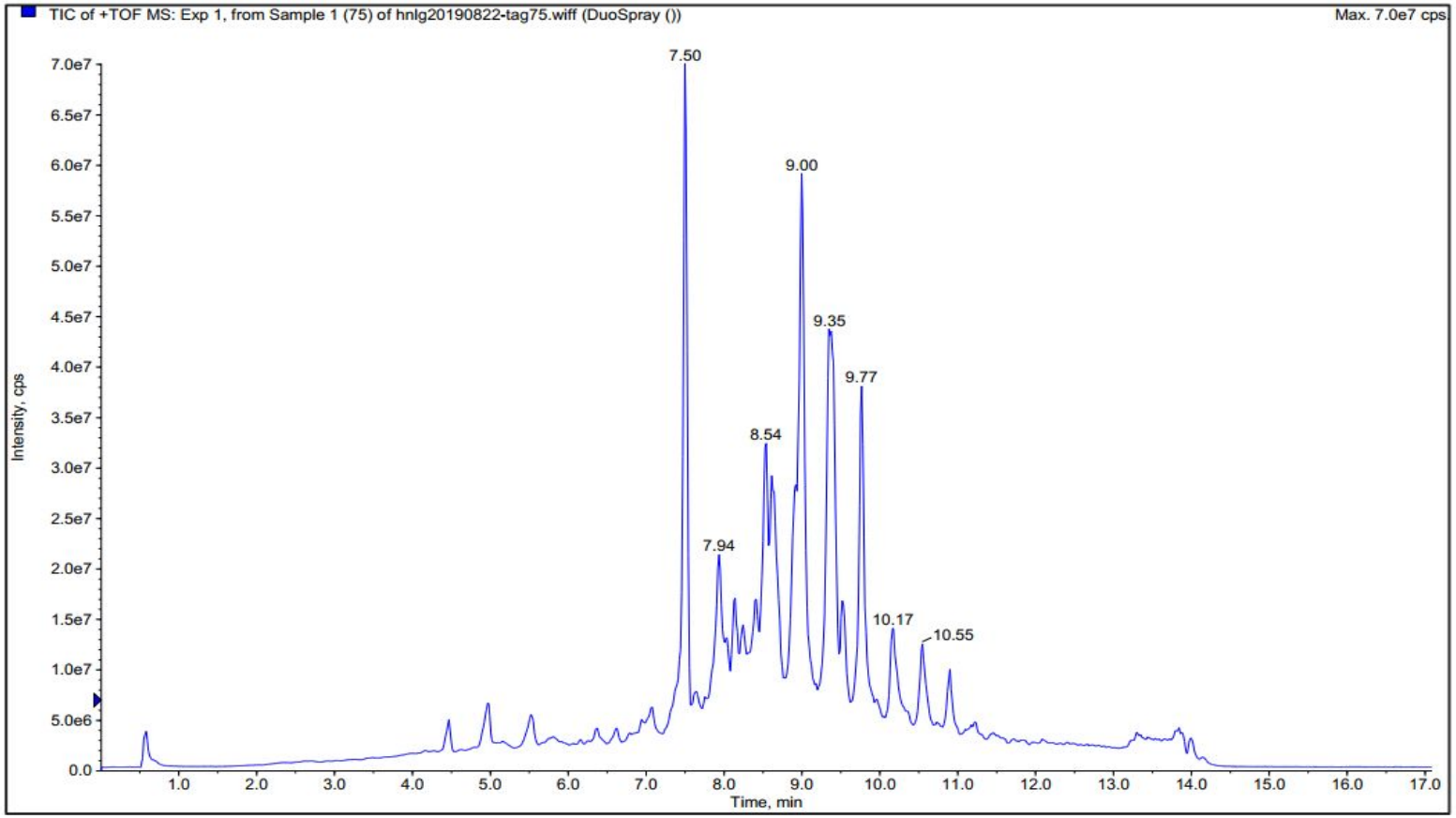

Figure S2 HPLC chromatographs of HMFS Ⅵ

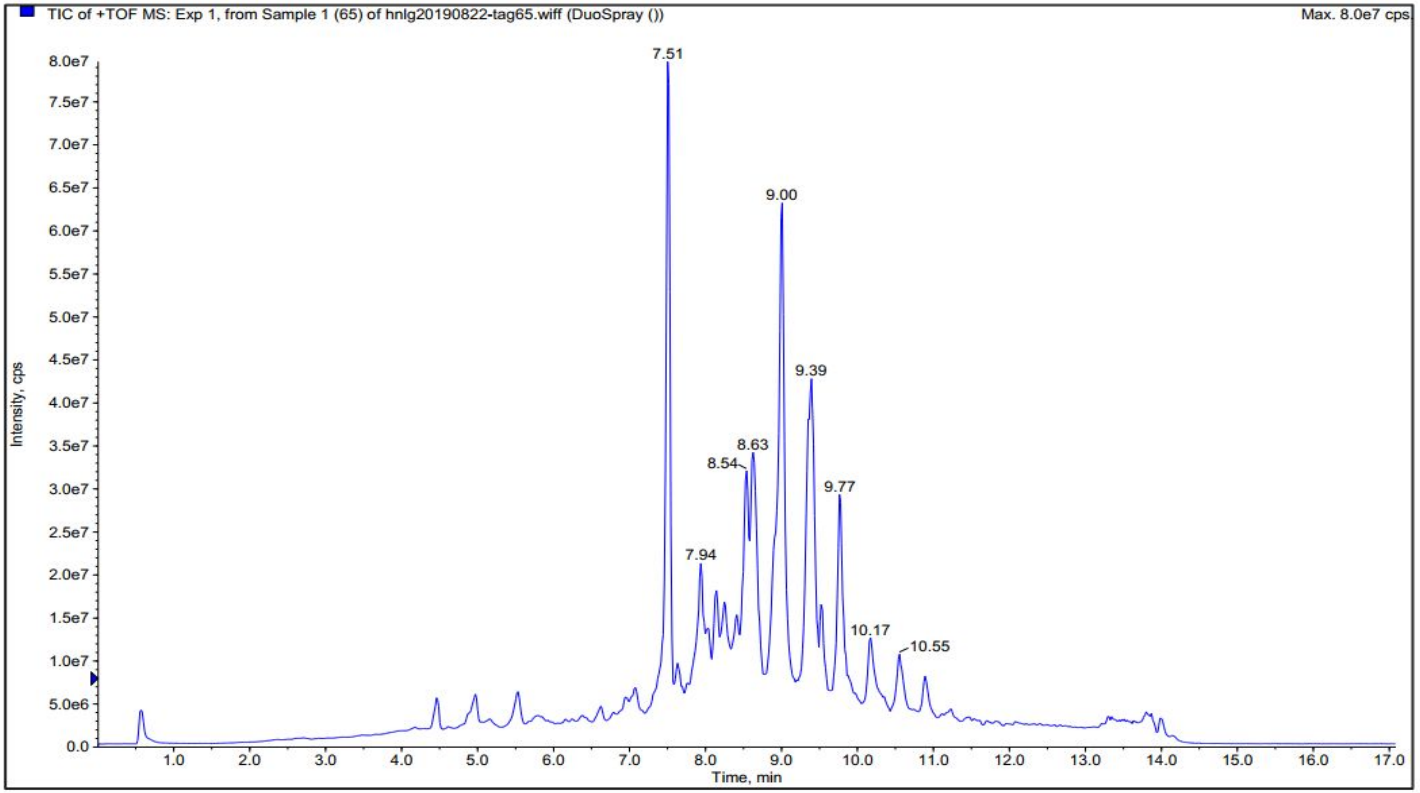

Figure S3 Mass spectra of representative TAGs identified in HMFS Ⅴ

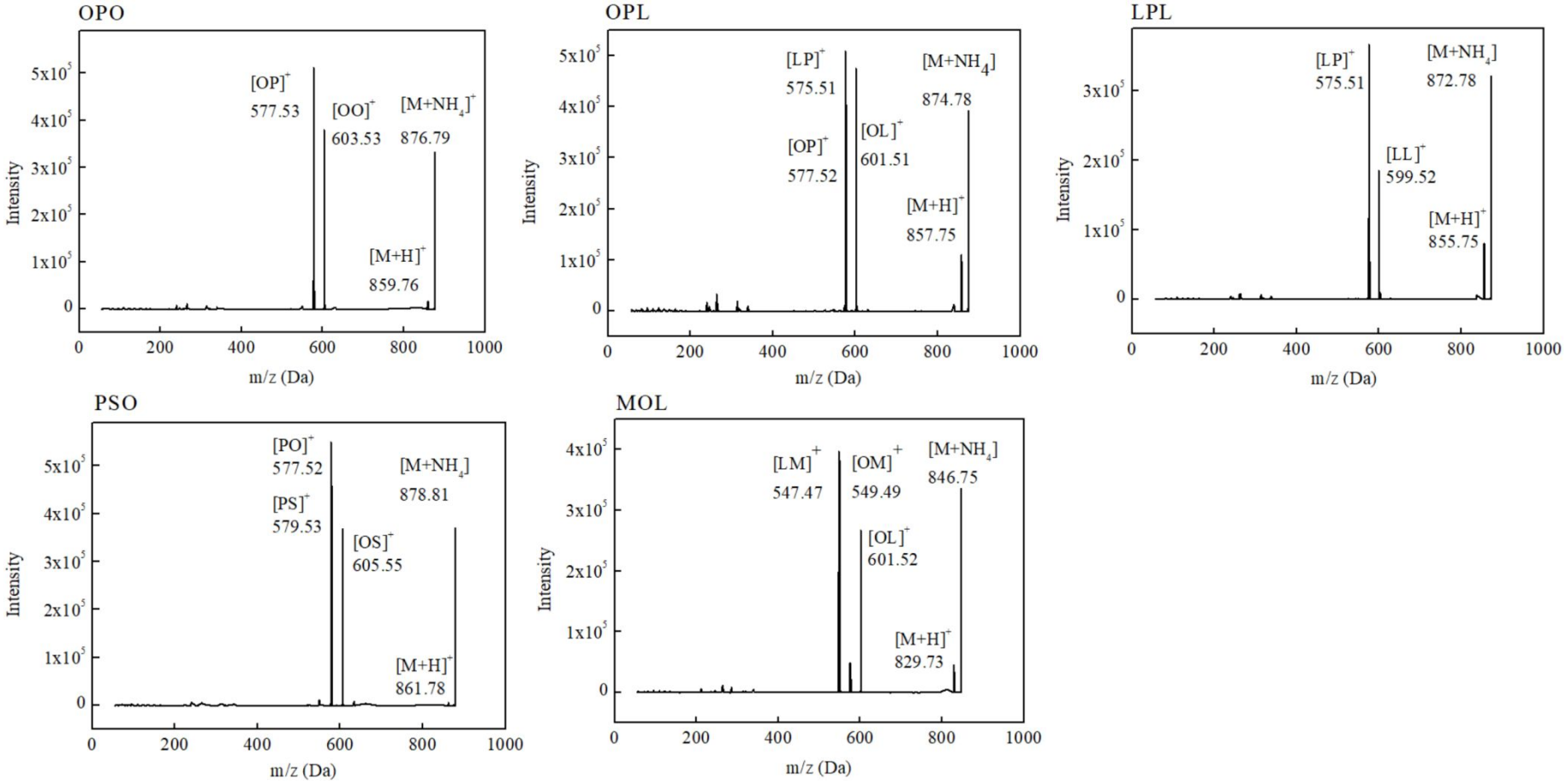
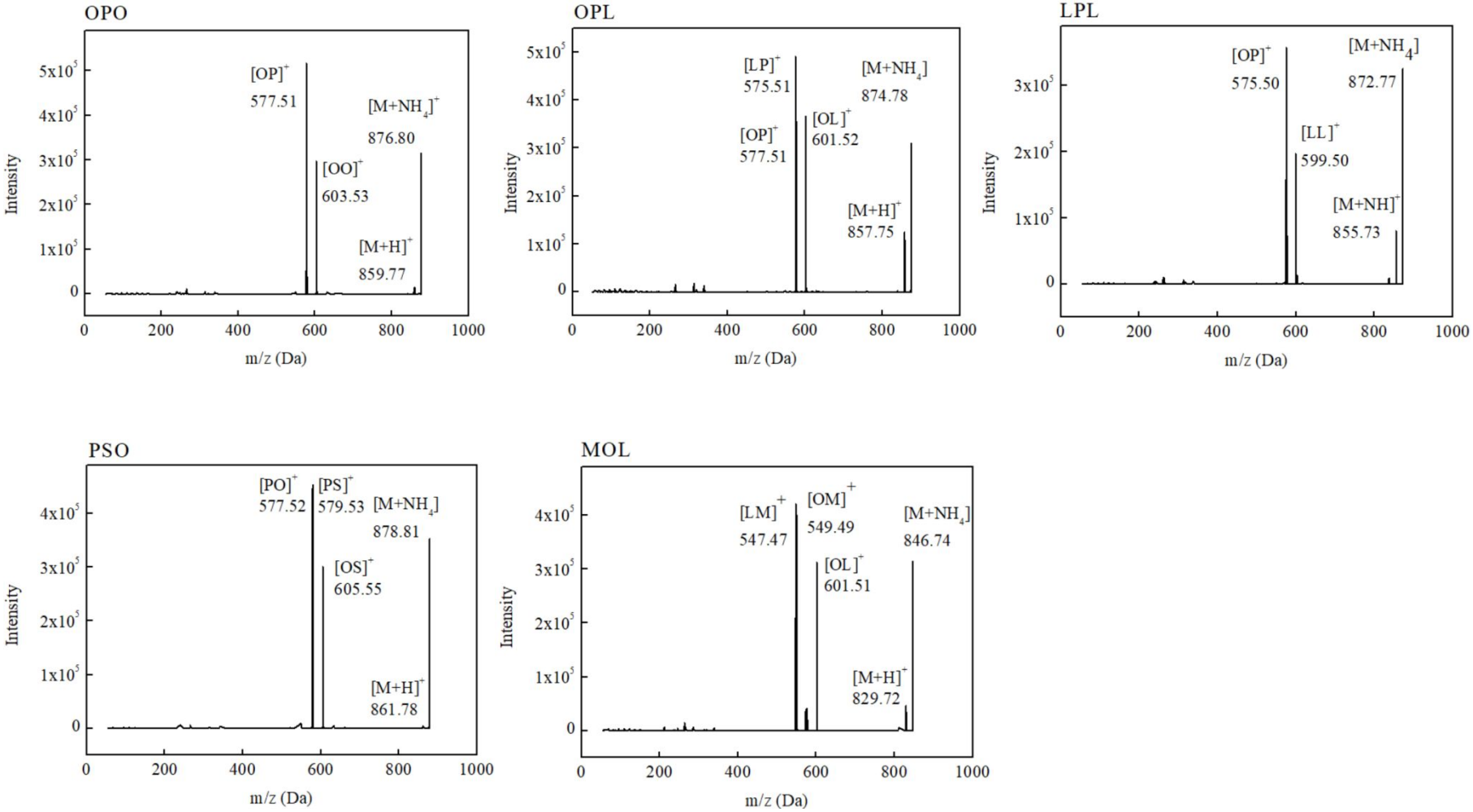
Figure S4 Mass spectra of representative TAGs identified in HMFS Ⅵ