Supporting information

Facile chemoenzymatic synthesis of unmodified anticoagulant ultra-low molecular weight heparin

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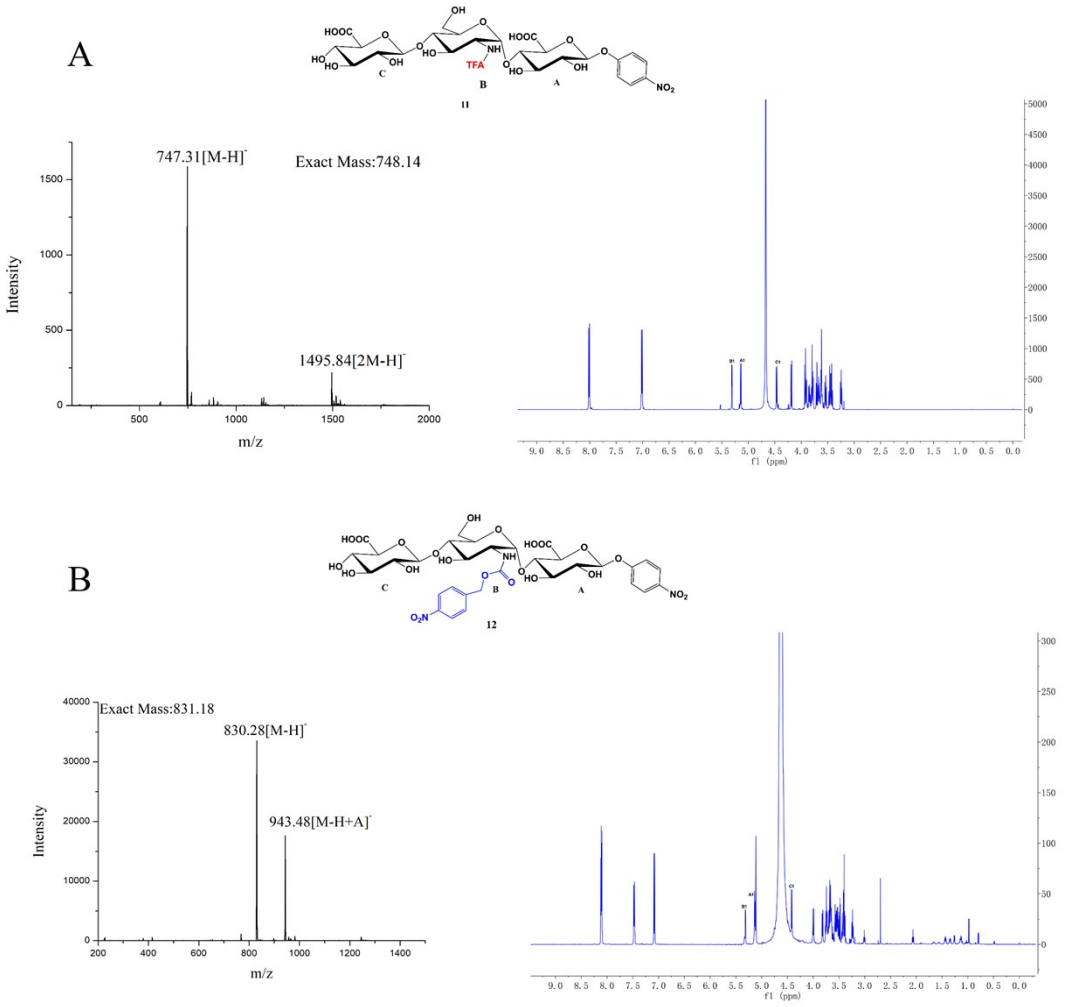

Fig. S1. (A)The ESI-MS and ^{1}H NMR spectra of 11; (B) The ESI-MS and ^{1}H NMR spectra of 12, where A is the deprotonated anion of trifluoroacetic acid

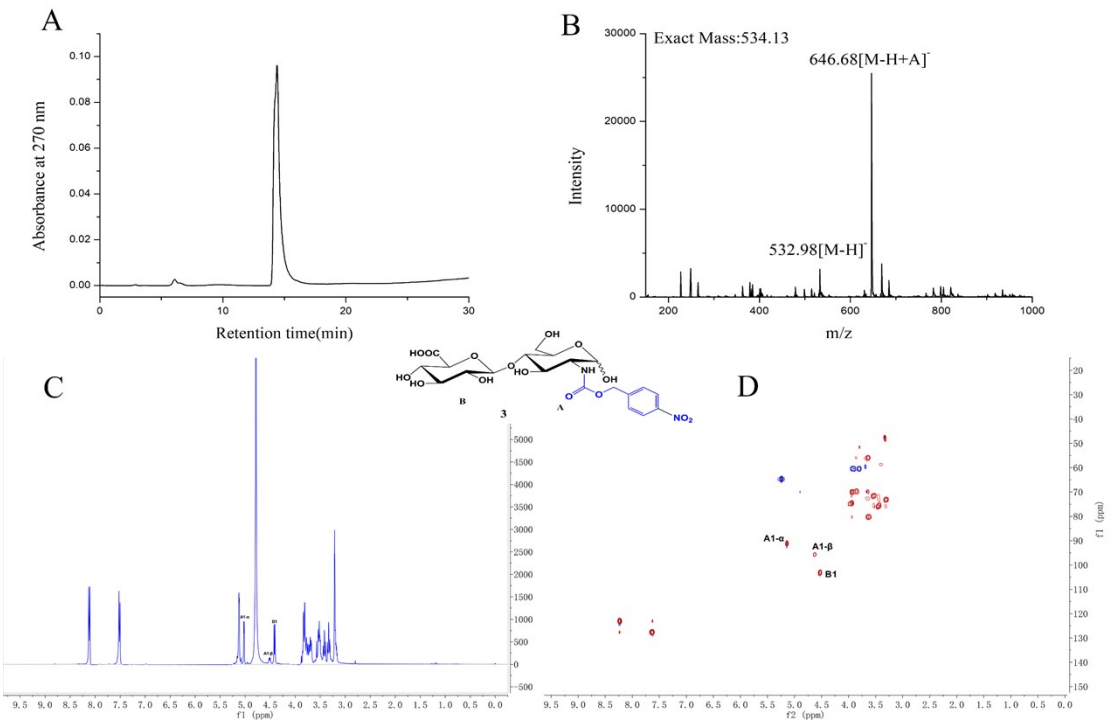

Fig. S2. The purity(A), ESI-MS (B), ^{1}H NMR (C) and HSQC (D) spectra of 3, where A is the deprotonated anion of trifluoroacetic acid.

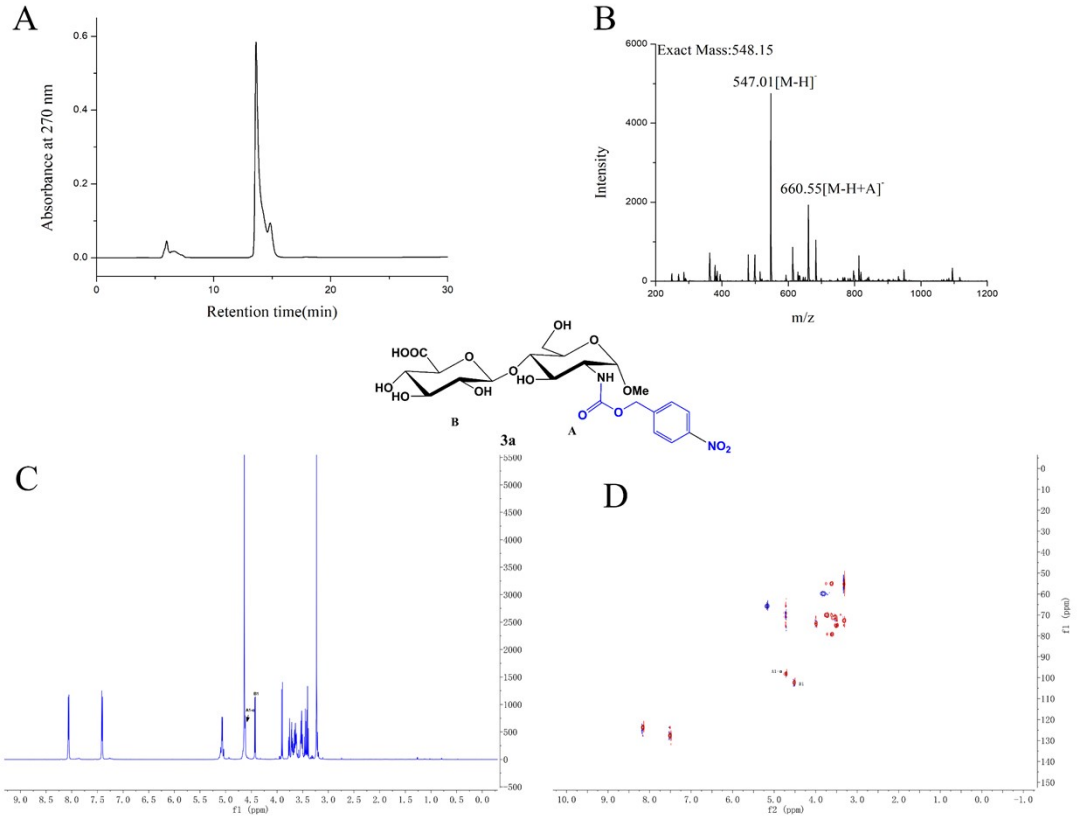

Fig. S3. The purity(A), ESI-MS (B), ^{1}H NMR (C) and HSQC (D) spectra of 3a, , where A is the deprotonated anion of trifluoroacetic acid.

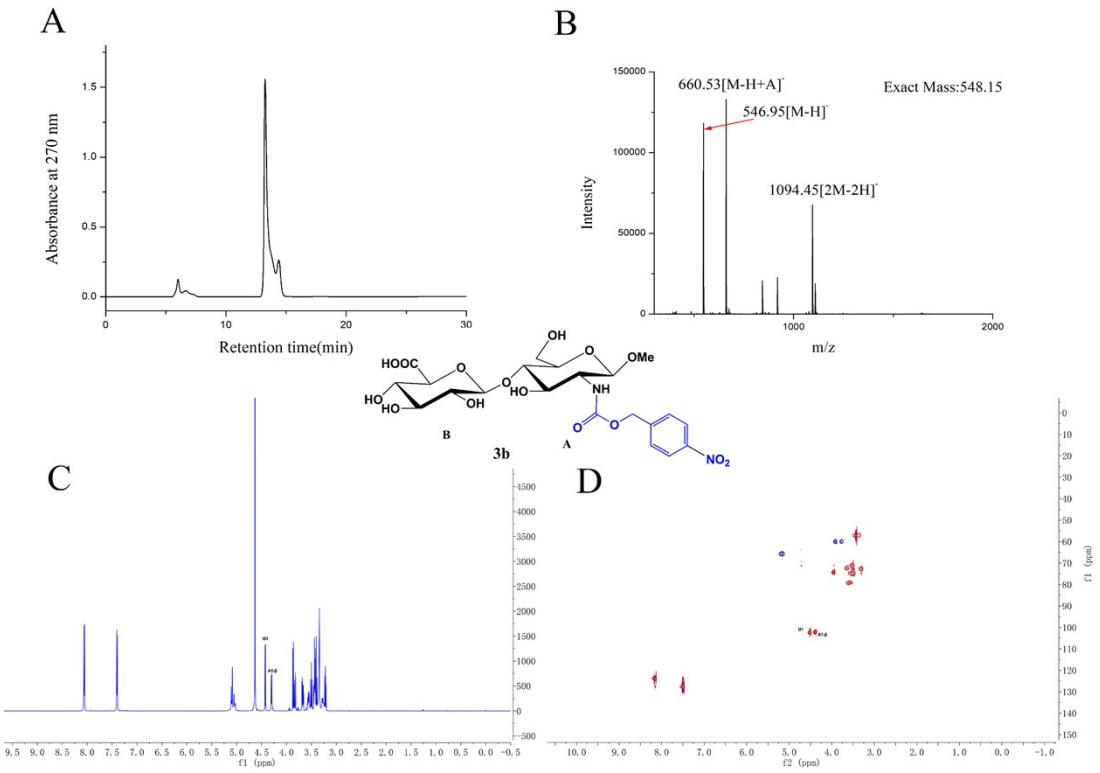

Fig. S4. The purity(A), ESI-MS (B), ^{1}H NMR (C) and HSQC (D) spectra of 3b, where A is the deprotonated anion of trifluoroacetic acid

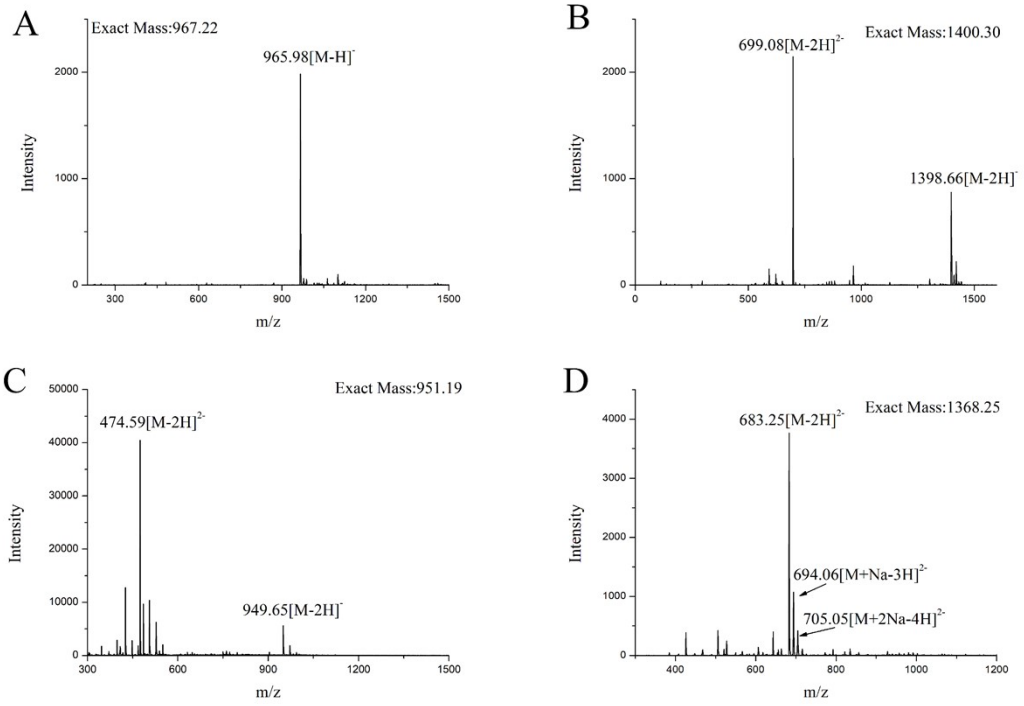

Fig. S5. The ESI-MS spectra of 14(A),15(B), *N*-sulfated tetrasaccharide of 14(C) and 16(D)

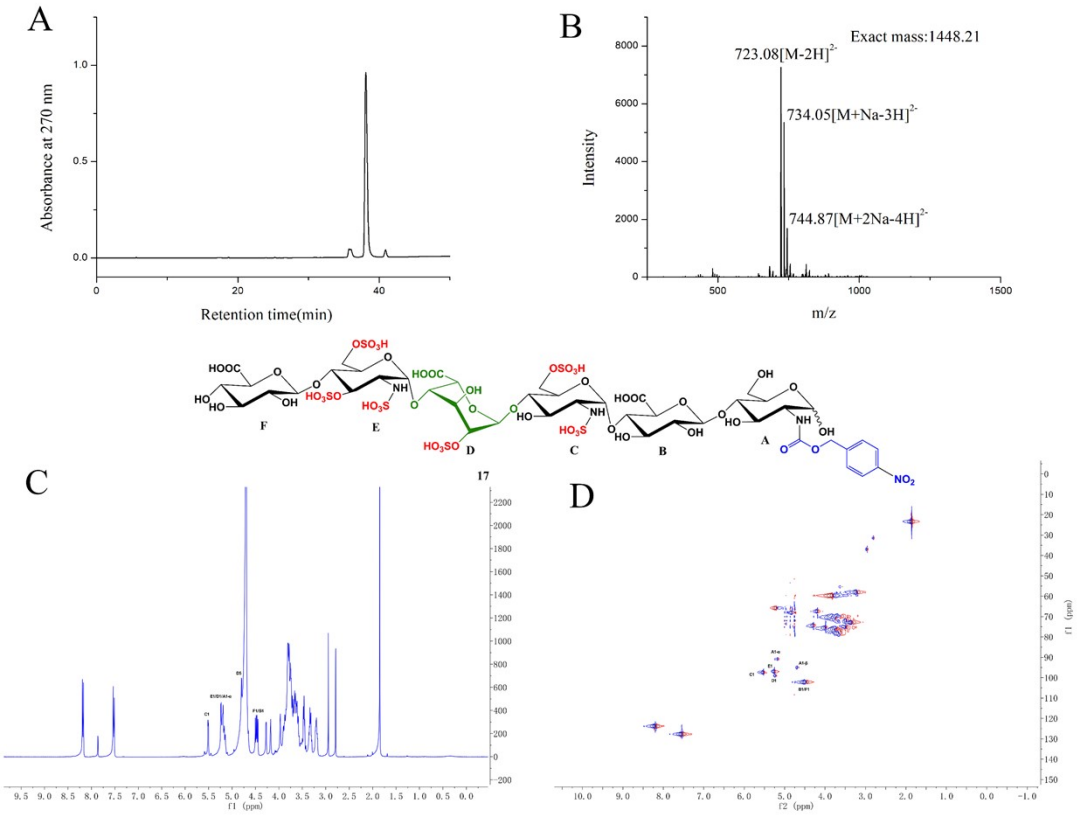

Fig. S6. The purity(A), ESI-MS (B), ^{1}H NMR (C) and HSQC (D) spectra of 17.

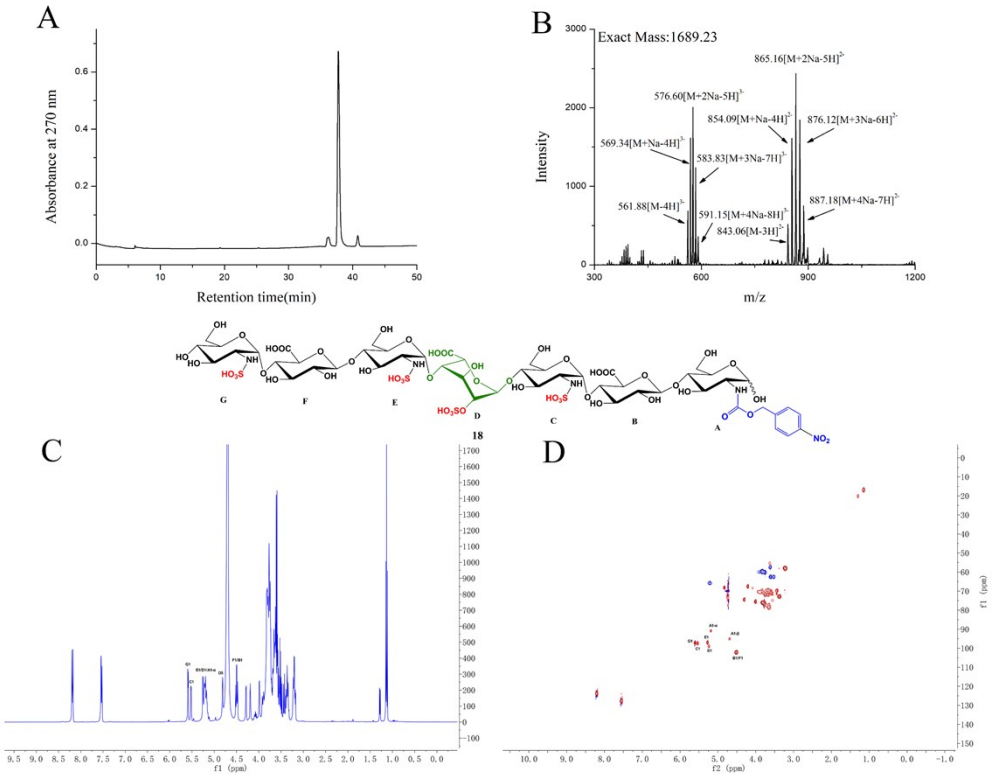

Fig. S7. The purity(A), ESI-MS (B), ^{1}H NMR (C) and HSQC (D) spectra of 18.

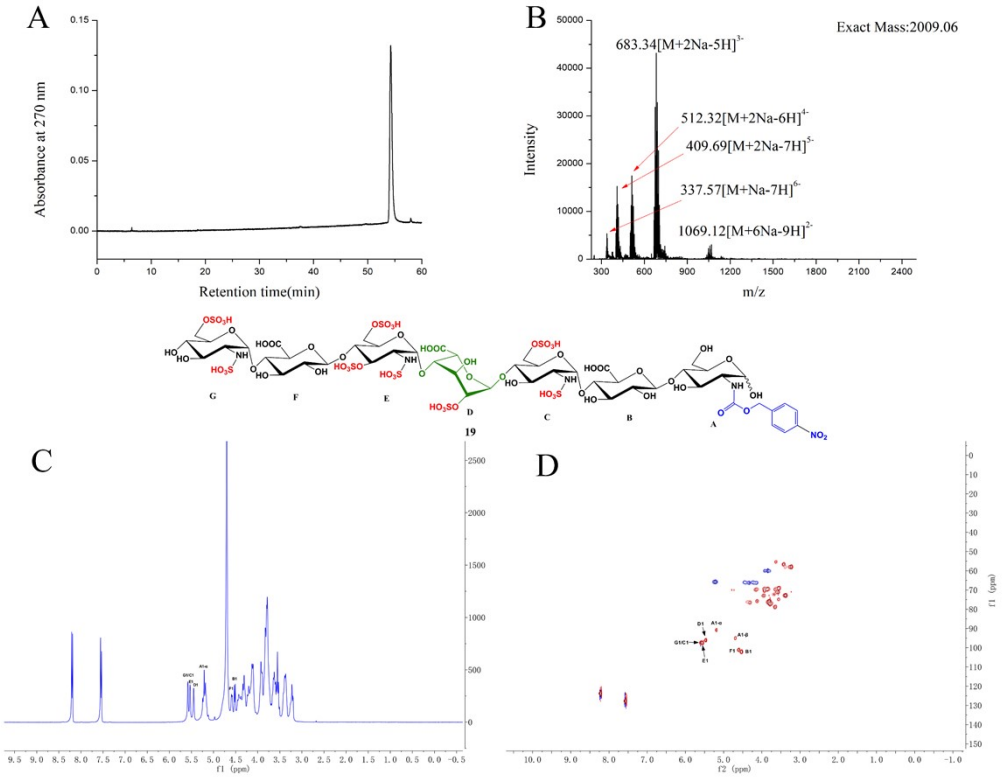

Fig. S8. The purity(A), ESI-MS (B), ^{1}H NMR (C) and HSQC (D) spectra of 19.

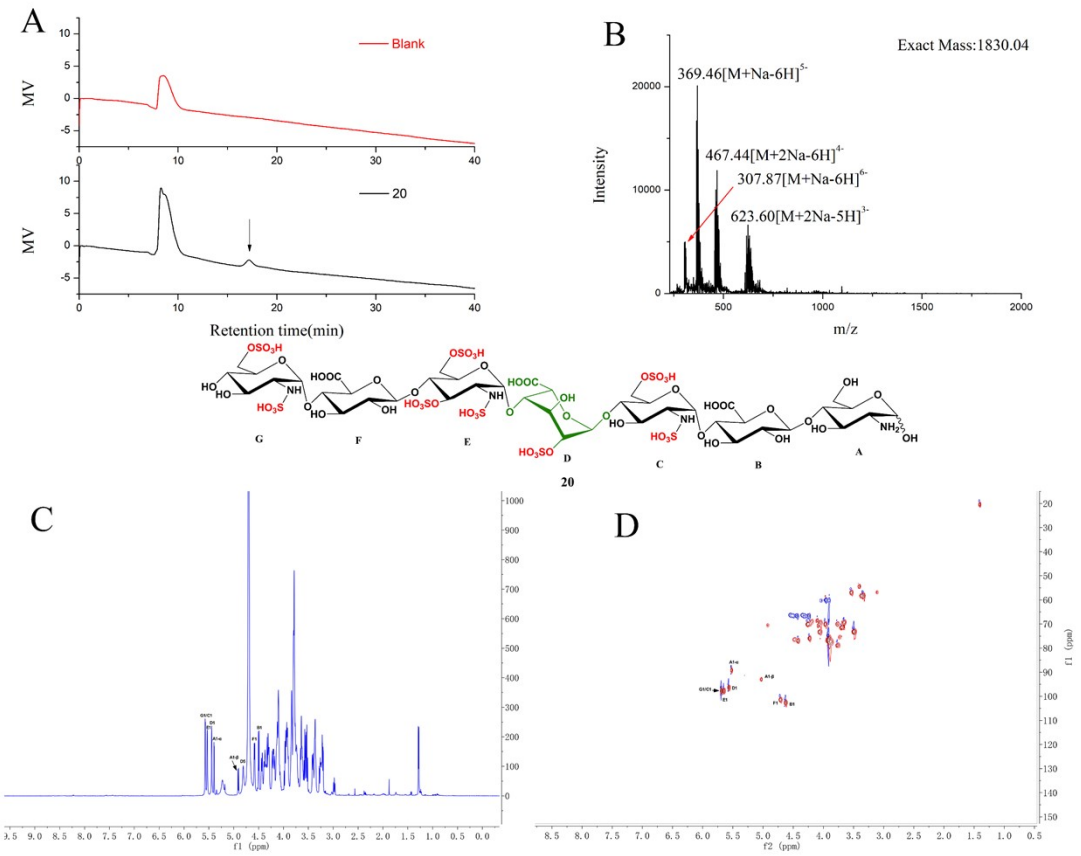
A
Blank
20
MV
Retention time(min)
B
Exact Mass:1830.04
369.46[M+Na-6H]5-
467.44[M+2Na-6H]4-
307.87[M+Na-6H]6-
623.60[M+2Na-5H]3-
Intensity
m/z
G
F
E
D
C
B
A
20
C
D
f1 (ppm)
f2 (ppm)

Fig. S9. The purity(A), ESI-MS (B), ^{1}H NMR (C) and HSQC (D) spectra of 20.

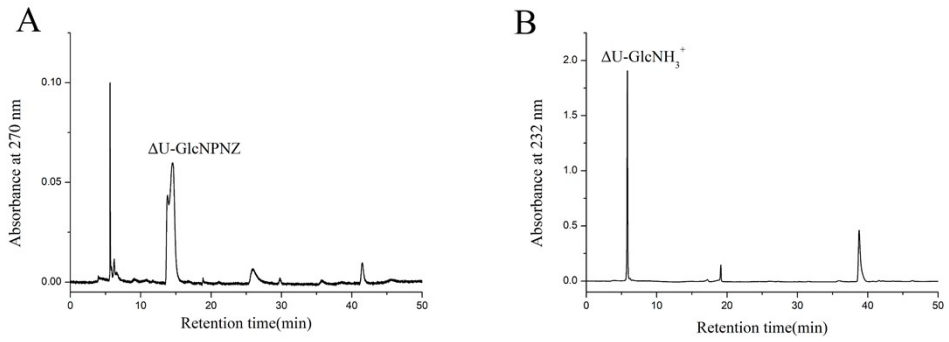

Fig. S10. Chromatograms of 19(A) and 20(B) after disaccharide analysis