

Electronic supplementary information (ESI)

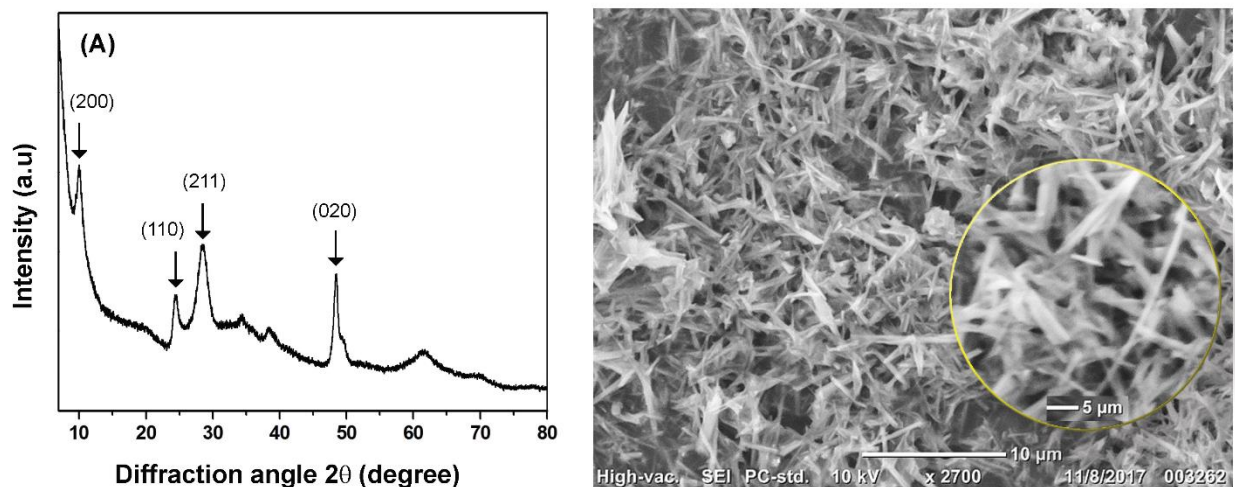


Fig. S1 (a) X-ray diffraction pattern and (b) SEM analysis result of as-synthesized Na-TNT.1

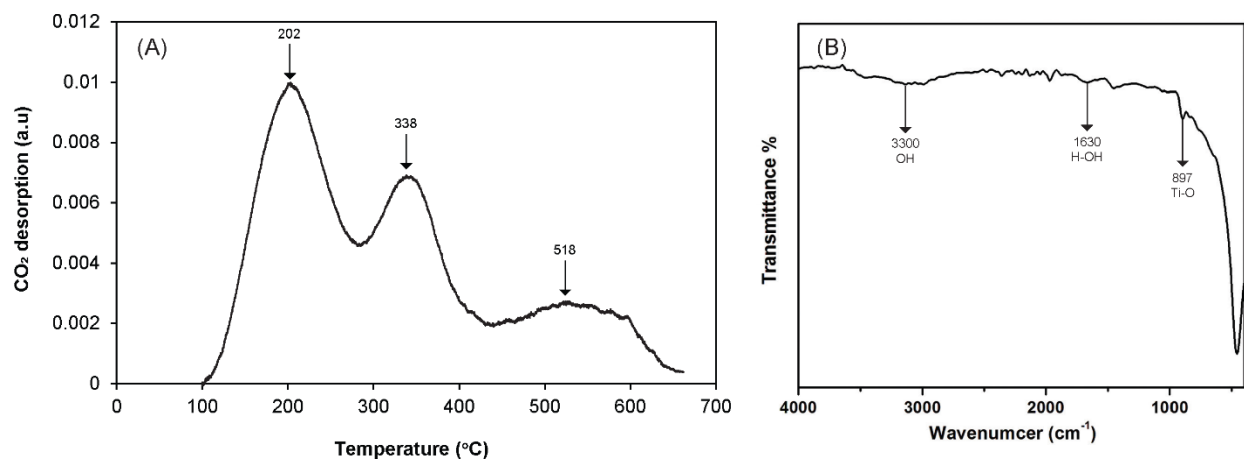


Fig. S2 (a) CO₂-TPD profile and (b) typical FTIR analysis result of as-synthesized Na-TNT.

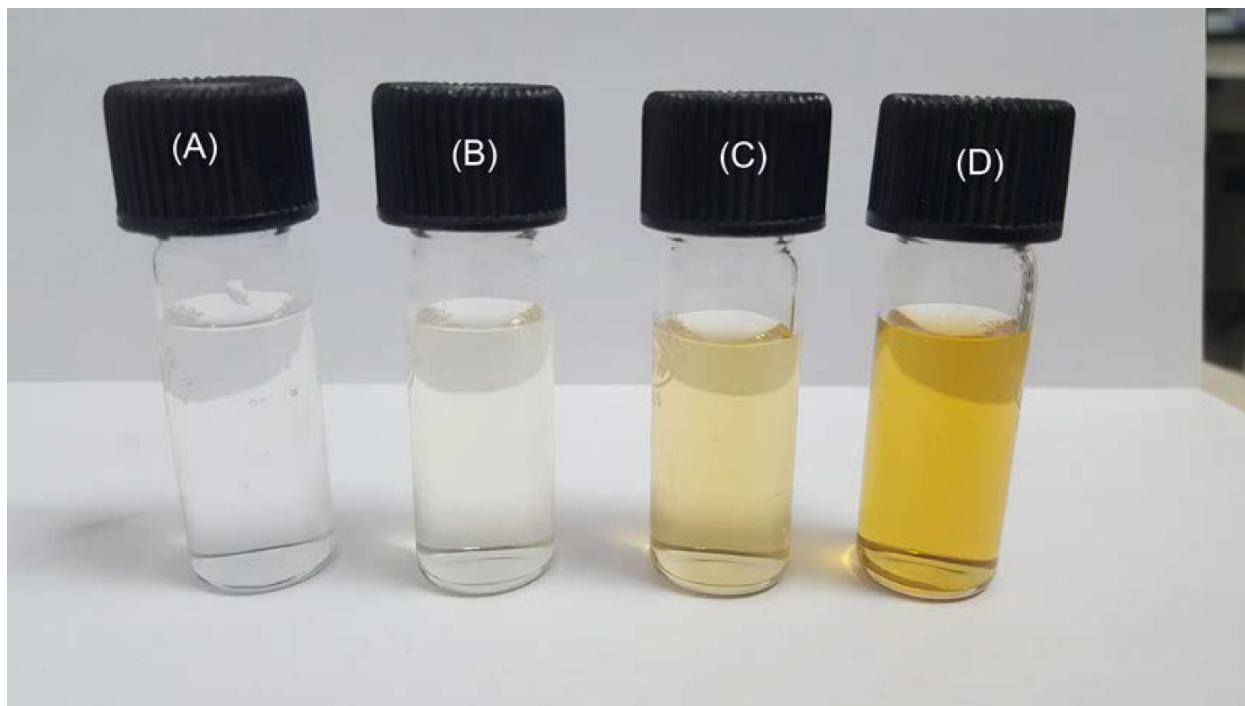


Fig. S3 Comparative images of the reaction medium (aqueous) corresponding to the incremented catalyst doses, a) 2.5%, b) 5.0%, c) 10% and d) 12.5% wt. per wt. glucose at 90 °C for 30 min.

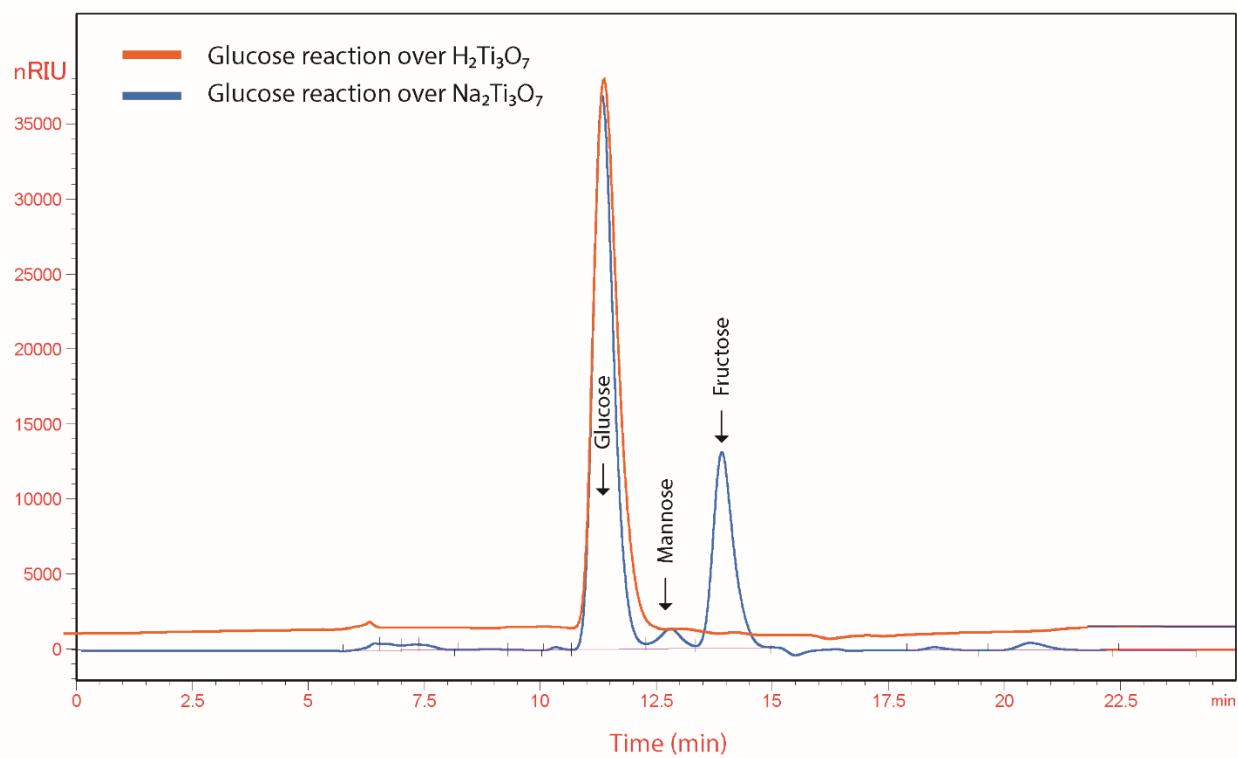


Fig. S4 Comparative chromatograms of glucose isomerization over Na ion exchanged nanotube (Na₂Ti₃O₇) and protonated titanate nanotube (H₂Ti₃O₇) in aqueous medium under modest reaction conditions.

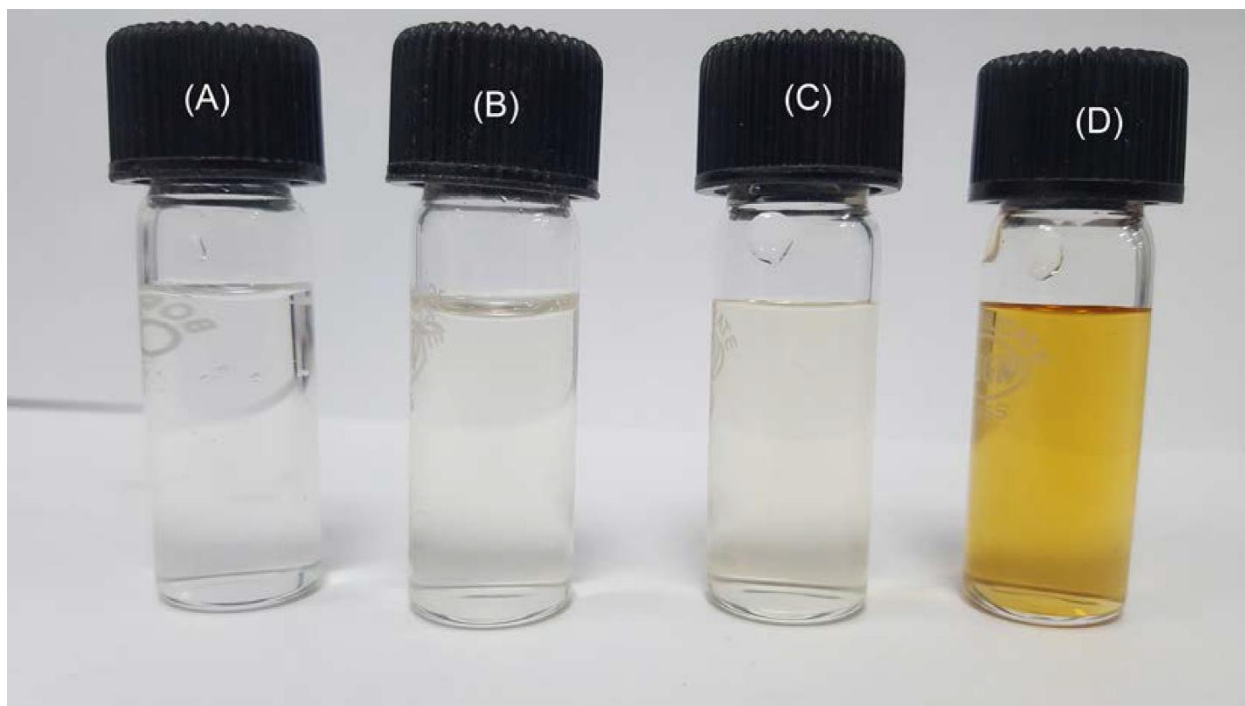


Fig. S5 Comparative images of the reaction medium (aqueous) corresponding to the raised temperatures doses, a) 60 °C, b) 80 °C, c) 100 °C and d) 120 °C (at 10% wt. catalyst dose for 30 min).

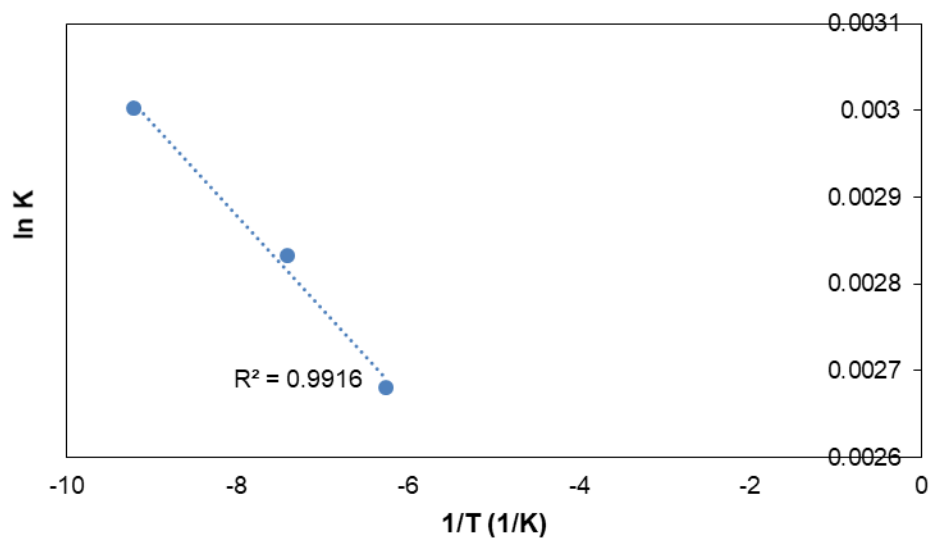


Fig. S6 Temperature dependency (60, 80 and 100 °C) of the glucose isomerization reaction over Na-TNT catalyst according to Arrhenius Law.

Table S1. Comparative response data of glucose isomerization to fructose in H₂O medium under different operating temperature with respect to time.^a

60 °C			80 °C			100 °C		
Time (min)	TOF ($\times 10^{-3}$)	Carbon balance	Time (min)	TOF ($\times 10^{-3}$)	Carbon balance	Time (min)	TOF ($\times 10^{-3}$)	Carbon balance
0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
5	1.39	98.93	2	13.31	95.77	2	19.97	90.63
15	1.61	98.26	3	10.35	92.68	3	15.45	88.98
30	1.16	97.79	5	10.78	89.14	5	11.00	86.78
60	0.81	95.69	15	3.80	87.14	10	5.69	84.79
90	0.56	93.79	30	1.99	83.78	15	4.10	82.86
150	0.38	91.70	60	0.95	82.68	30	2.03	80.97
-	-	-	90	0.63	81.68	60	0.95	79.85
-	-	-	150	0.38	80.98	90	0.62	75.19
-	-	-	-	-	-	150	0.37	76.26

^a Reaction conditions: 10.0% wt. catalyst loading per wt. glucose. TOF – Turn over frequency is calculated as moles of fructose formed per mole of Na charge compensating cation supply per second. Carbon balance is derived based on the difference between moles of carbon in products (fructose and mannose) and unreacted glucose, and to the mole of carbon in the initial glucose.

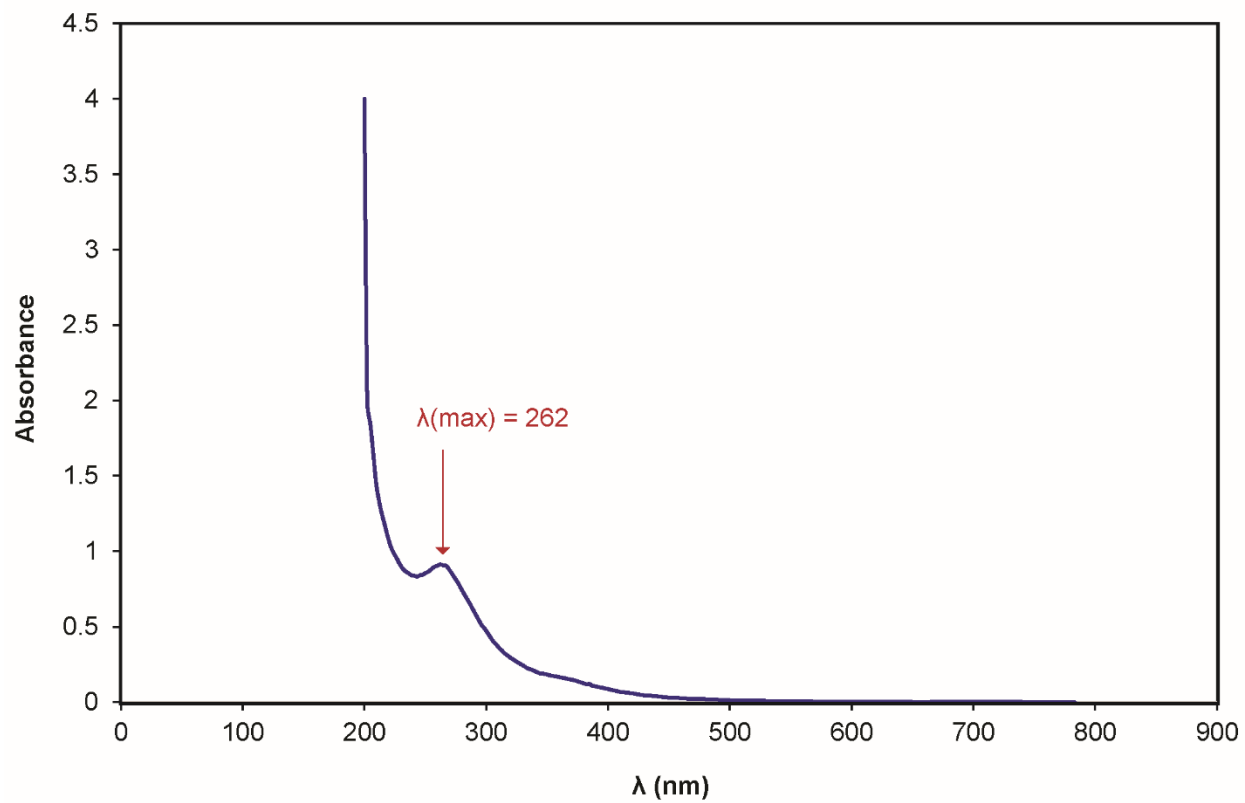


Fig. S7 UV-vis absorption profile of catalyst sample obtained after 4 recycle runs conducted under optimum process conditions.

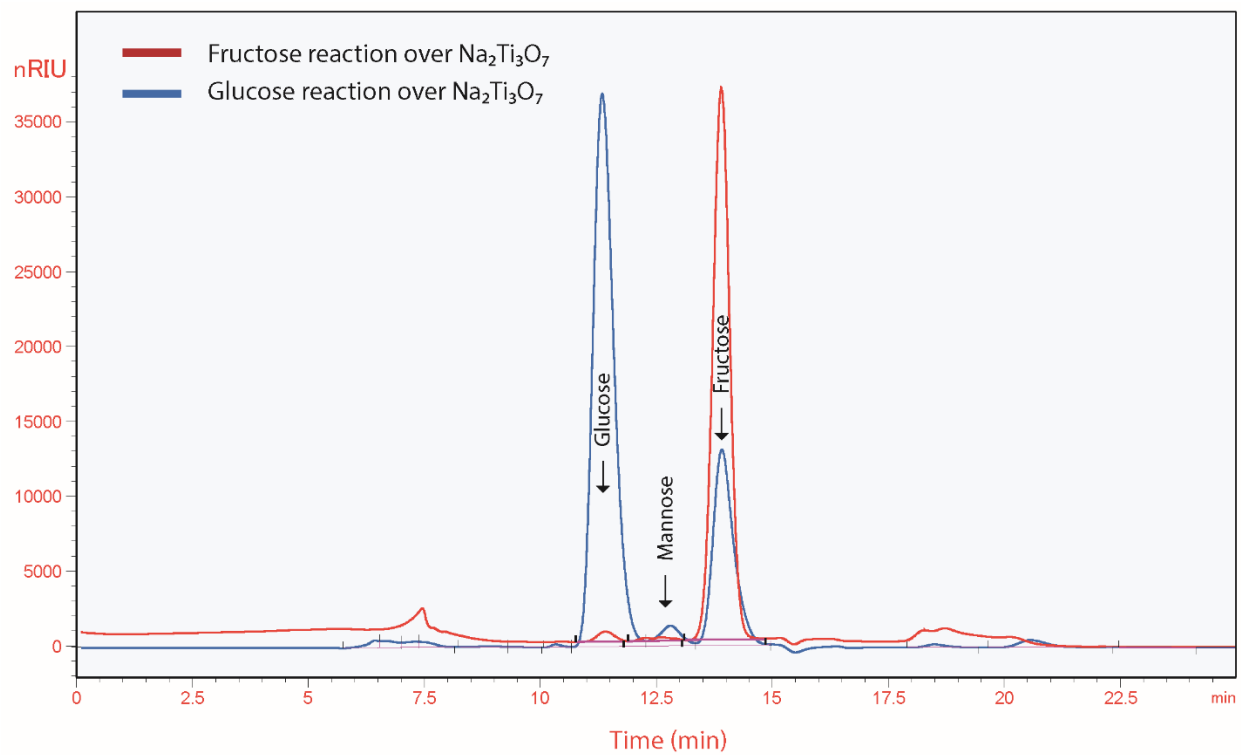


Fig. S8 Comparative chromatograms of glucose and fructose isomerization in aqueous medium under modest reaction conditions.

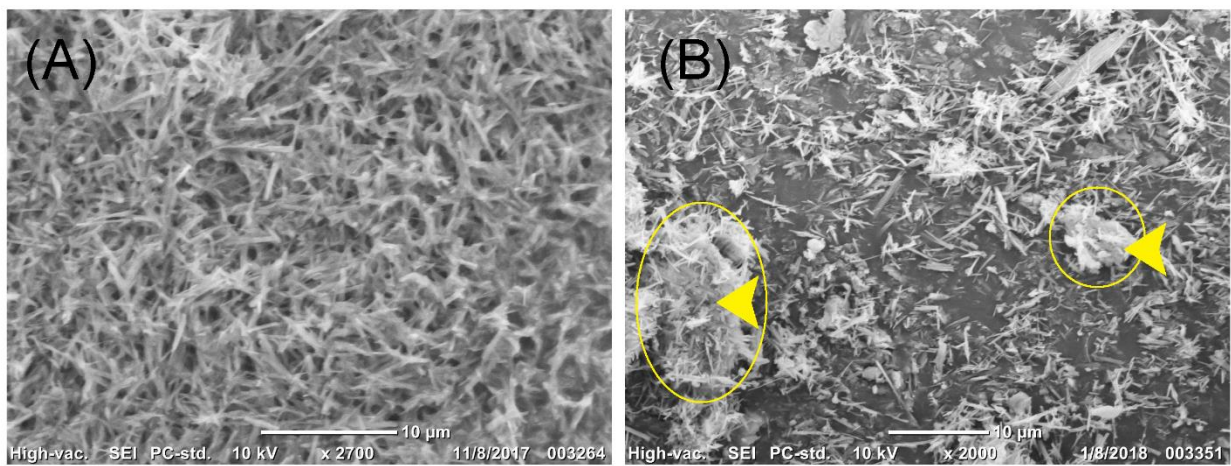


Fig. S9 Comparative SEM images of the Na-TNT before (a) and after 4 repeat runs (b) during glucose isomerization reaction in aqueous medium.

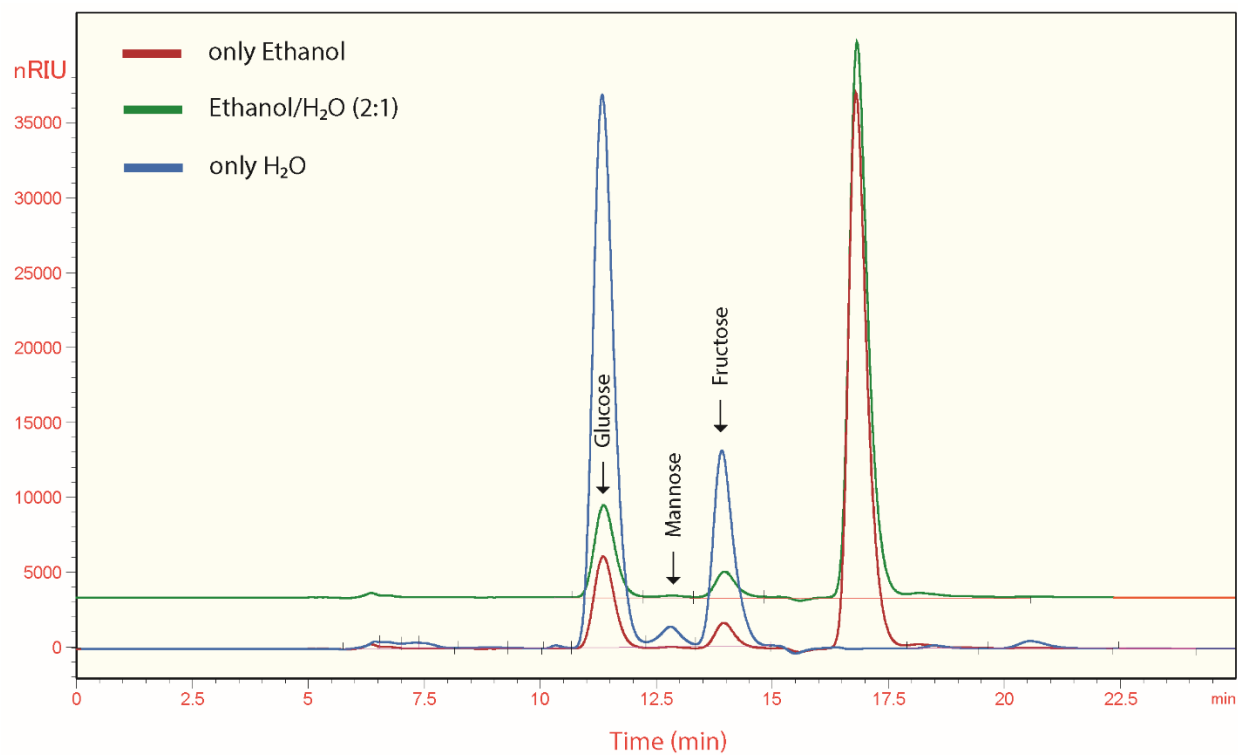


Fig. S10 Comparative chromatograms of glucose isomerization in different alcohol and water medium under modest reaction conditions.