Electronic Supplementary Material (ESI) for RSC Advances

Depolymerization of cellulosic feedstocks using magnetically separable functionalized graphene oxide

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Supporting Information

Estimation of activation energy

Activation energy of the reaction was calculated using Arrhenius equation. Half-life time ($t_{1/2}$) at different temperatures was recorded for calculate activation energy.

$$\boxed{k = Ae^{-E_a/RT}} \quad \text{— Eq. 1}$$

Where k is the reaction rate coefficient, A is the frequency factor for the reaction, R is the universal gas constant (8.314J/K/mol) and T is the temperature (in kelvin).

T (K)	**1/T**	**k(h^{-1})**	**lnk**
348	0.002874	0.060	-2.81341
373	0.002681	0.079	-2.53831

The activation energy was found algebraically by substituting two rate constants (k_1, k_2) and the two corresponding reaction temperatures (T_1, T_2) into the two-point form of the Arrhenius Equation (2).

$$\boxed{E_a = \frac{R\,T_1\,T_2}{(T_1 - T_2)} \ln\frac{k_1}{k_2}} \quad \text{— Eq. 2}$$

Figure S1: A representative chromatogram of HPLC analysis for hydrolyzed microcrystalline cellulose.

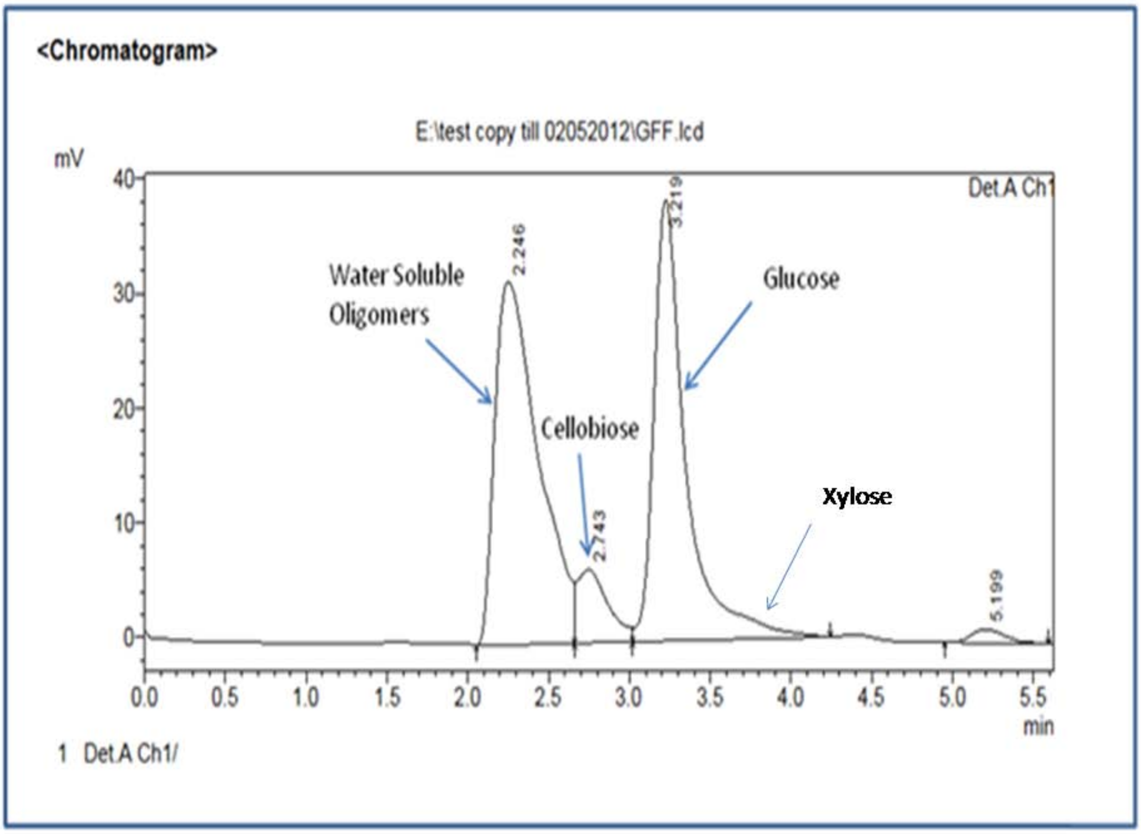

Figure S2: NMR of water soluble hydrolysis products for Fe-GO catalyst.

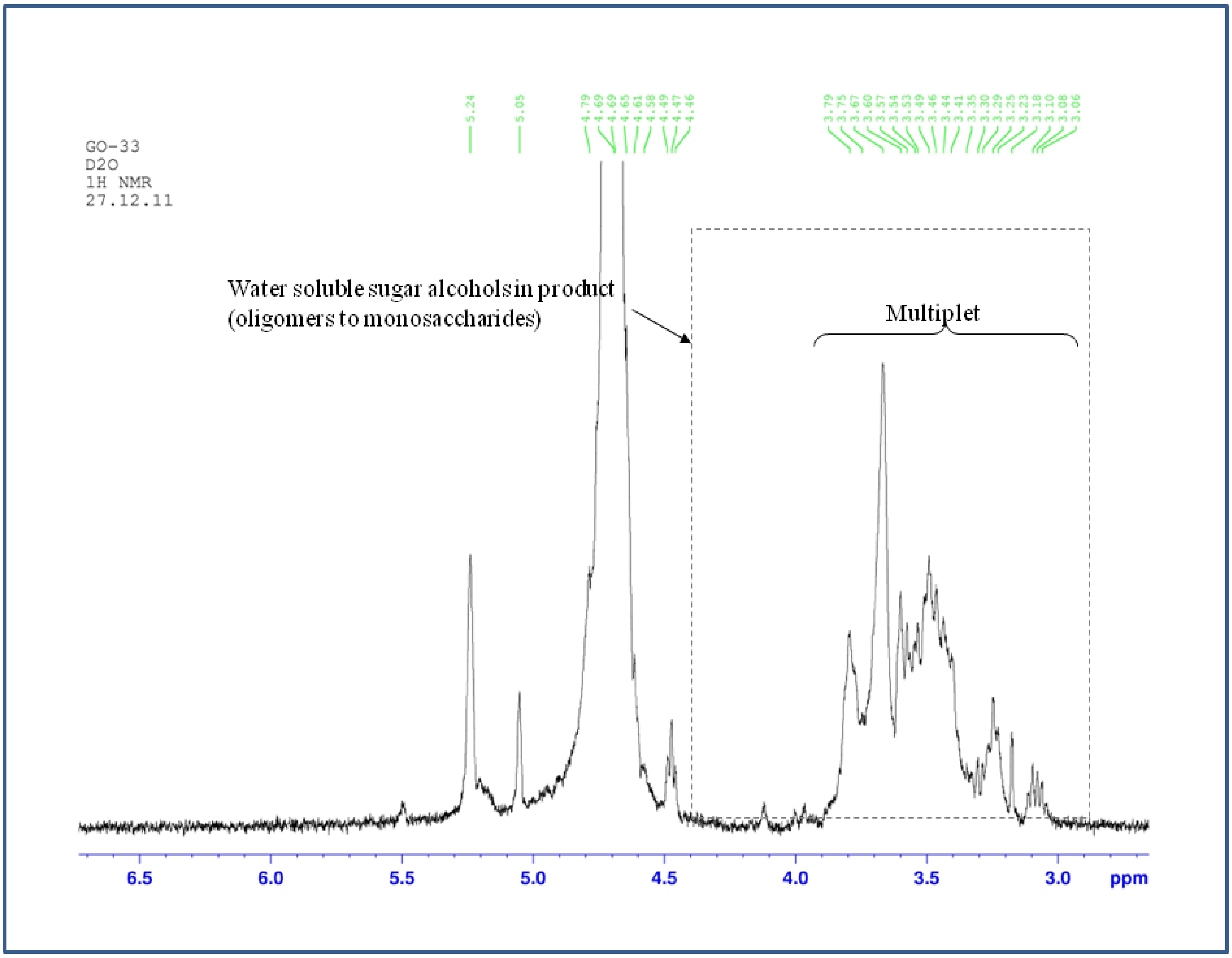

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Figure S3: MALDI-TOF-MS for the reaction solution. *m/z* = 162 represents the mass number of glucose monomer[-(-O-$C_6H_{10}O_4$-)n-] in β-1,4 glucan.

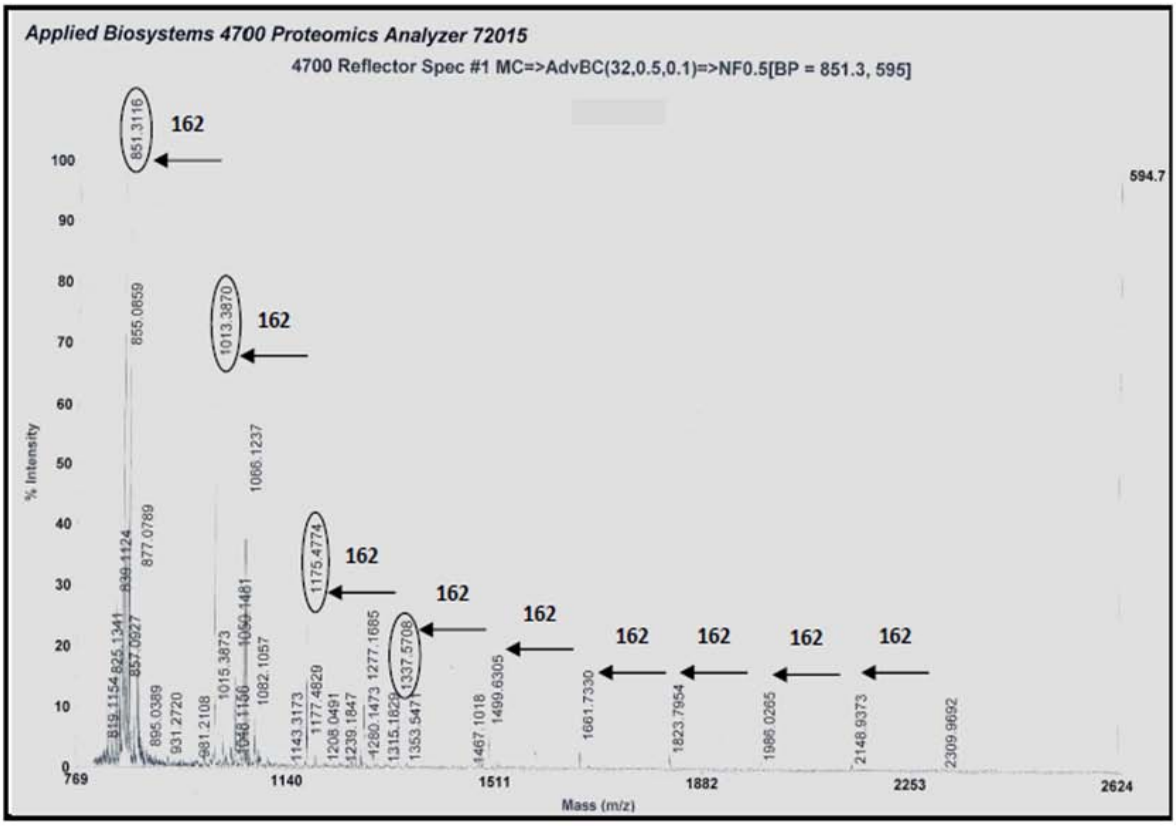
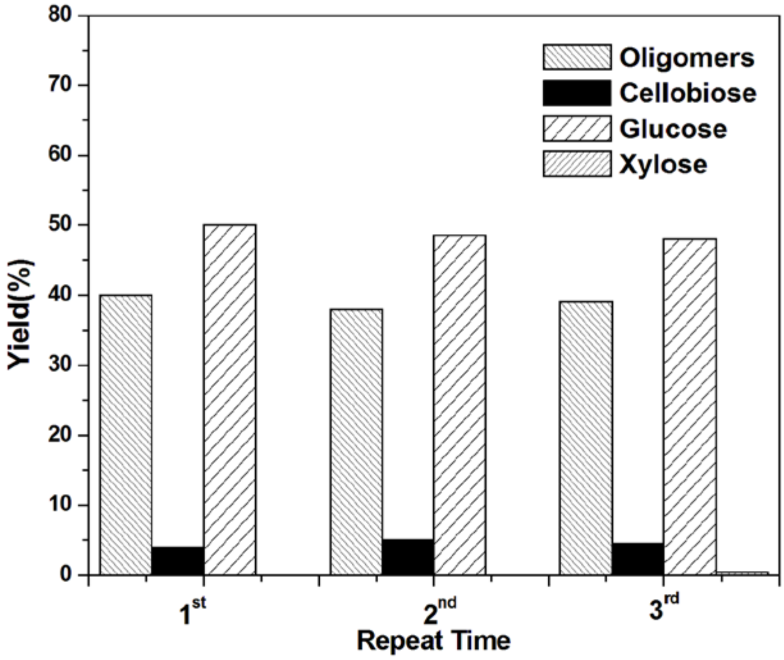


Figure S4: Recycling activity for the hydrolysis of crystalline cellulose with functionalized magnetic graphene oxide Fe-G-SO_3H (reaction time=44h).



Supporting Scheme 1: Mechanistic steps involved in the hydrolysis of cellulose into water soluble carbohydrates.