

SUPPORTING INFORMATION

Cyclodextrin mediated polymer coupling via thiol-maleimide conjugation: facile access to functionalizable hydrogels

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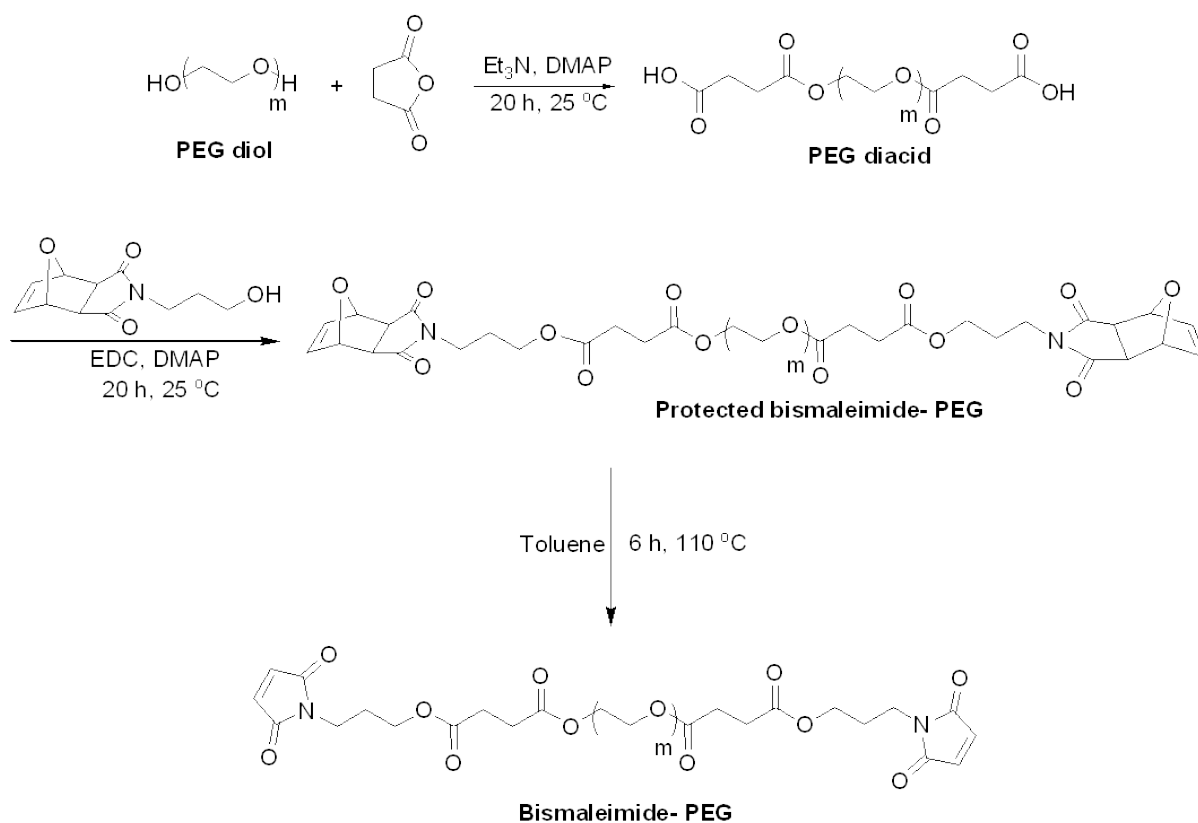
Typical Synthesis of Bis-acid 2K PEG: Anhydrous PEG (2 g, 1 mmol) prepared by azeotropic evaporation of toluene was dissolved in THF (5 mL) and triethylamine (0.42 mL, 2.99 mmol) was added at 0 °C. Succinic anhydride (0.34 g, 3.42 mmol) and DMAP (0.05 g, 0.40 mmol) were dissolved in THF (5 mL) in a separate round bottom flask and the mixture was slowly added to the PEG solution at 0 °C in a drop wise fashion. The solution was stirred for 20 h under N₂. The reaction mixture was concentrated *in vacuo*, dissolved in minimal amount of CH₂Cl₂ and precipitated in cold diethyl ether twice to give pure bis-acid PEG as a white solid (2.13 g, 97% yield) that was used directly in the next step. Similar protocol was used to obtain PEG-diacids from PEG-diols with different molecular weights.

Synthesis of Protected Bismaleimide PEGs: A flask equipped with a magnetic stirrer was charged with PEG 6K diacid (0.48 mmol, 3 g), protected maleimide containing alcohol (1.44 mmol, 320.0 mg), EDCI (1.05 mmol, 202.0 mg) and DMAP (0.096 mmol, 11.0 mg). A 10 ml portion of anhydrous CH₂Cl₂ was then added to reaction vessel and mixture was stirred overnight at room temperature under N₂ atmosphere. After reaction completed more CH₂Cl₂ was added and mixture was extracted with 30 ml saturated NaHCO₃ solution. The organic layer collected and dried over Na₂SO₄. After filtering, solvent was removed under reduced pressure. Then, the polymer was dissolved in minimum amount of CH₂Cl₂ and precipitated by pouring into cold anhydrous ether. The precipitate was then filtered and dried *in vacuo* (71 % yield).

¹HNMR (CDCl₃, δ, ppm) 6.50 (s, 4H, CH=CH), 5.24 (s, 4H, CH bridgehead protons), 4.23 (t, 4H, *J* = 4.7 Hz, OCH₂), 4.04 (t, 4H, *J* = 5.8 Hz, NCH₂), 3.82–3.42 (m, 4H, OCH₂CH₂ of PEG), 2.83 (s, 4H, CH-CH bridge protons), 2.68–2.58 (m, 8H, CH₂C=O), 1.90 (tt, 4H, *J* = 5.8, 4.6 Hz, NCH₂CH₂CH₂O).

Activation of the Protected Maleimide Groups: Deprotection of maleimide groups were carried out by heating polymers at 110 °C in anhydrous toluene for 12 h. Solvent was evaporated to obtain the polymers in quantitative manner. Thermogravimetric analysis (TGA) of deprotected polymers shows that removal of furan group was achieved quantitatively (Figure S1).

¹HNMR (CDCl₃, δ, ppm) 6.69 (s, 4H, CH=CH), 4.23 (t, 4H, *J* = 4.8 Hz, OCH₂), 4.06 (t, 2H, *J* = 5.7 Hz, NCH₂), 3.83–3.41 (m, 4H x *m*, OCH₂CH₂ of PEG), 2.67–2.57 (m, 8H, CH₂C=O), 1.93 (tt, 2H, *J* = 5.6, 4.7 Hz, NCH₂CH₂CH₂O).



Scheme S1. Synthesis of maleimide end functionalized PEGs (PEG-*bm*).

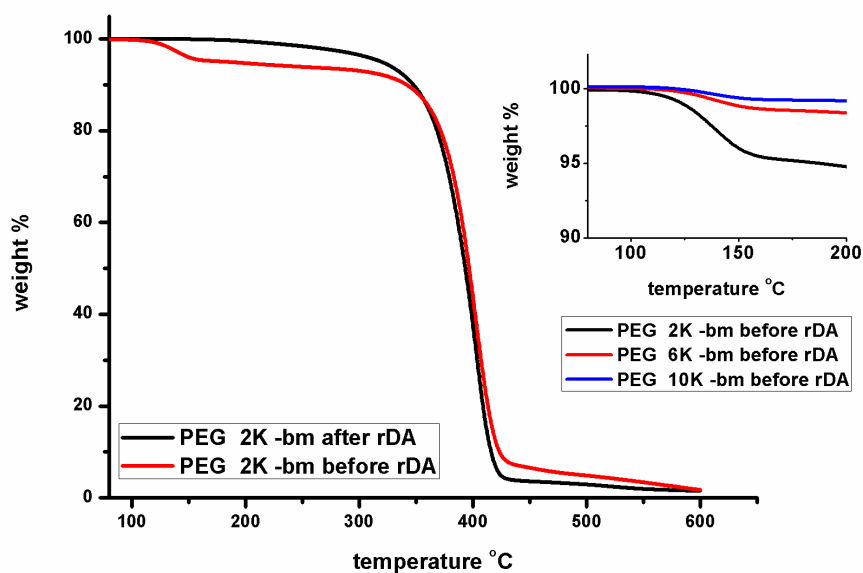


Figure S1. TGA thermograms of PEG 2K-*bm* polymer before and after rDA reaction. Upper thermogram shows the comparison of 2K, 6K and 10 K polymers in terms of weight loss.

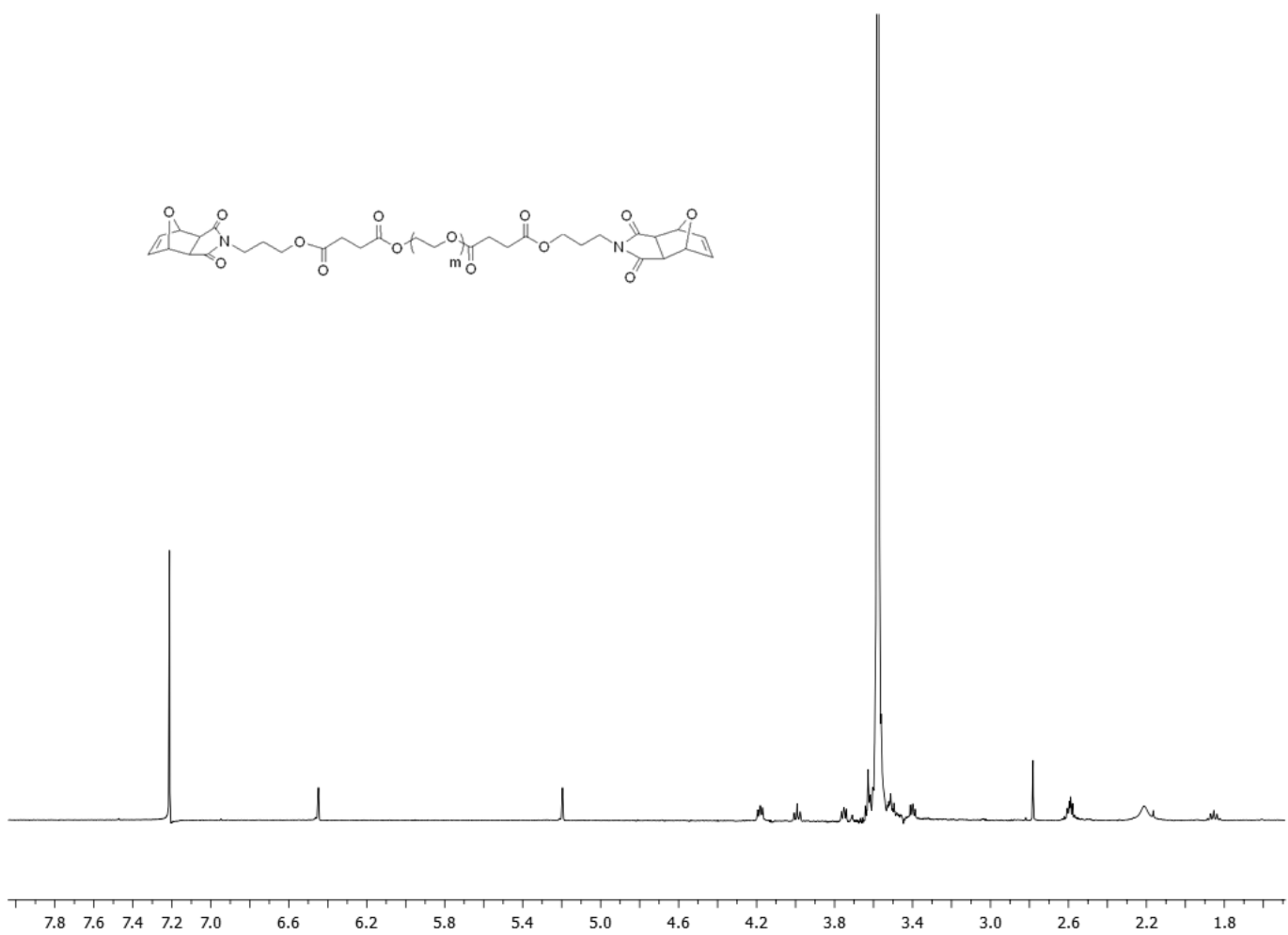


Figure S2. ¹H NMR spectrum of PEG 6K-*bm* polymer before rDA reaction.

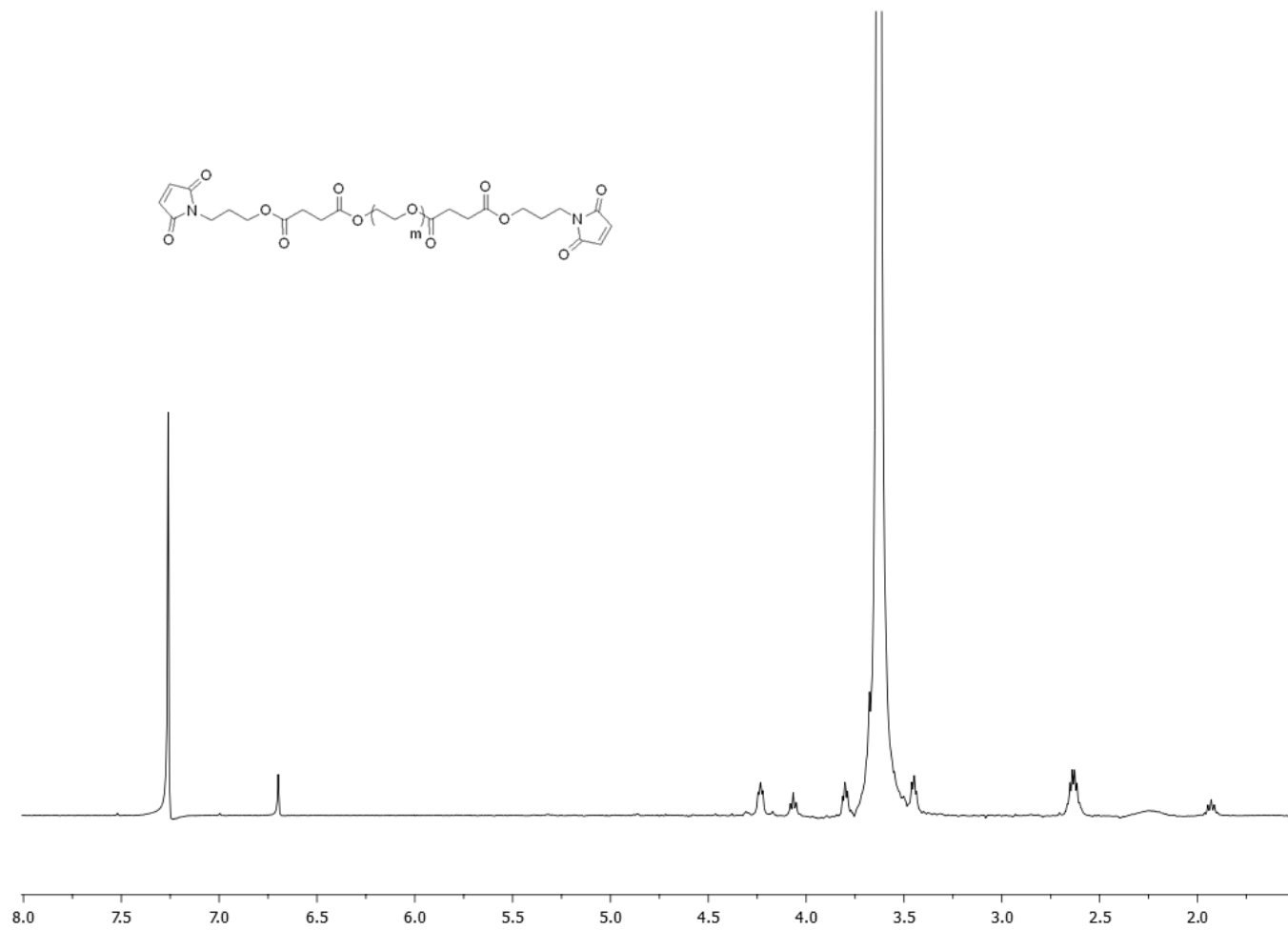


Figure S3. ¹H NMR spectrum of PEG 6K-*bm* polymer after rDA reaction.