PEG-S – ^{1}H NMR (400 MHz, $CDCl_3$) δ: 3.63 (s, 182H), 3.54 (m, 2H), 3.49 (t, *J* = 5.8 Hz, 2H), 3.36 (s, 3H), 2.26 (t, *J* = 7.2 Hz, 2H), 1.74 (p, *J* = 6.9 Hz, 2H), 1.60 (m, 2H)

PEG-T – ^{1}H NMR (400 MHz, $CDCl_3$) δ: 3.90 – 3.84 (m, 1H), 3.67 – 3.58 (s, 182H), 3.53 (t, *J* = 3.7 Hz, 2H), 3.41 (dd, *J* = 6.6, 2.8 Hz, 1H), 3.36 (s, 3H), 3.00 (ddd, *J* = 13.6, 8.1, 5.2 Hz, 1H), 2.26 (t, *J* = 7.2 Hz, 2H), 1.72 (ddt, *J* = 10.3, 7.0, 3.8 Hz, 2H), 1.61 (q, *J* = 6.1 Hz, 2H), 1.14 (d, *J* = 6.3 Hz, 3H)

PEG-D – ^{1}H NMR (400 MHz, $CDCl_3$) δ: 3.63 (s, 182H), 3.53 (m, 2H), 3.44 (d, *J* = 5.5 Hz, 2H), 3.36 (s, 3H), 2.43 (t, *J* = 5.9 Hz, 2H), 2.19 (t, *J* = 7.0 Hz, 2H), 1.66 (m, 2H), 1.57 (m, 2H)

PEG-E –^{1}H NMR (400 MHz, $CDCl_3$) δ: 3.63 (s, 182H), 3.53 (m, 2H), 3.36 (s, 3H), 3.27 (q, 2H), 2.34 (t, *J* = 6.8 Hz, 2H), 2.21 (t, *J* = 7.2 Hz, 2H), 1.81 (m, 2H), 1.69 (m, 2H), 1.59 (m, 2H)

PEG-R –^{1}H NMR (400 MHz, $CDCl_3$) δ: 3.63 (s, 182H), 3.53 (m, 4H), 3.47 (m, 2H), 3.36 (s, 3H), 2.33 (t, *J* = 7.2 Hz, 2H), 1.65 (m, 6H), 1.57 (s, 2H)

PEG-K –^{1}H NMR (400 MHz, $CDCl_3$) δ: 3.64 (s, 182H), 3.55 (m, 2H), 3.38 (s, 3H), 3.25 (q, *J* = 5.9 Hz, 2H), 2.95 (m, 2H), 2.88 (s, 2H), 2.25 (t, *J* = 6.8 Hz, 2H), 1.66 (m, 2H), 1.54 (m, 2H), 1.47 (m, 2H)

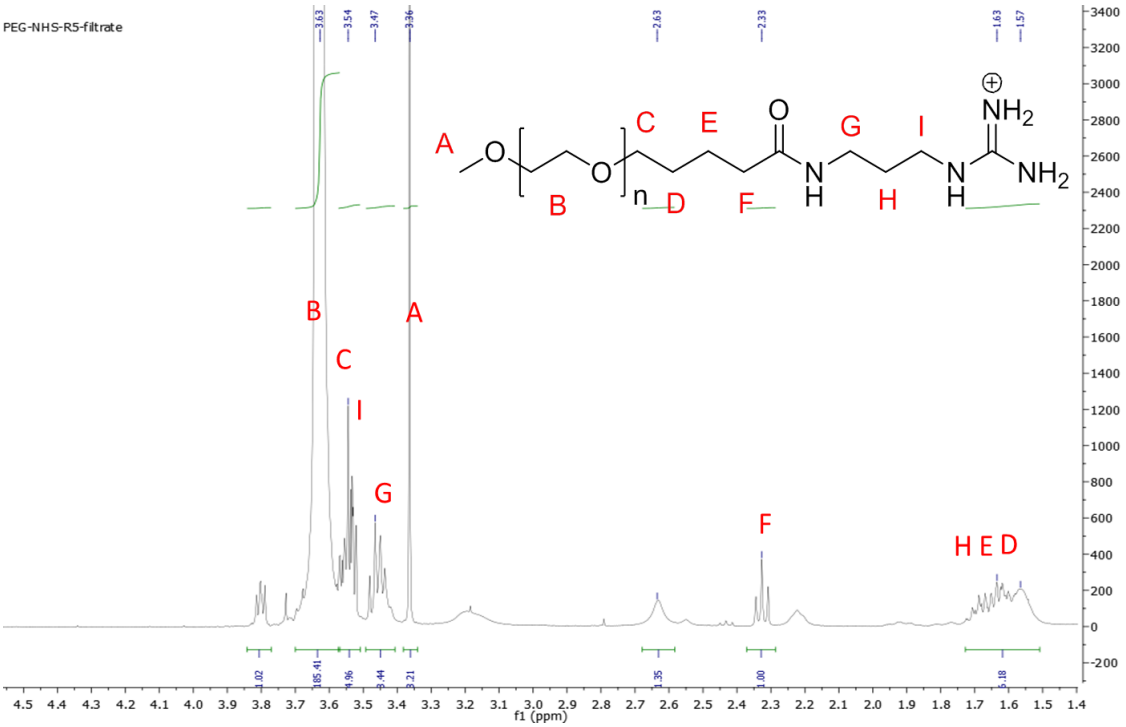
PEG-F –^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.29 (m, 2H), 7.21 (t, *J* = 6.5 Hz, 3H), 3.64 (s, 182H), 3.55 (m, 2H), 3.47 (t, *J* = 7.0 Hz, 2H), 3.38 (s, 3H), 2.80 (t, *J* = 7.1 Hz, 2H), 2.18 (t, *J* = 7.3 Hz, 2H), 1.67 (m, 2H), 1.58 (m, 2H)

PEG-Y – ^{1}H NMR (400 MHz, $CDCl_3$) δ: 6.98 (d, *J* = 8.5 Hz, 2H), 6.75 (d, *J* = 8.5 Hz, 2H), 3.60 (s, 182H), 3.52 (m, 2H), 3.41 (m, 2H), 3.35 (s, 3H), 2.69 (t, *J* = 6.9 Hz, 2H), 2.13 (m, 2H), 1.63 (p, *J* = 7.0 Hz, 2H), 1.51 (p, *J* = 7.2, 6.6 Hz, 2H).

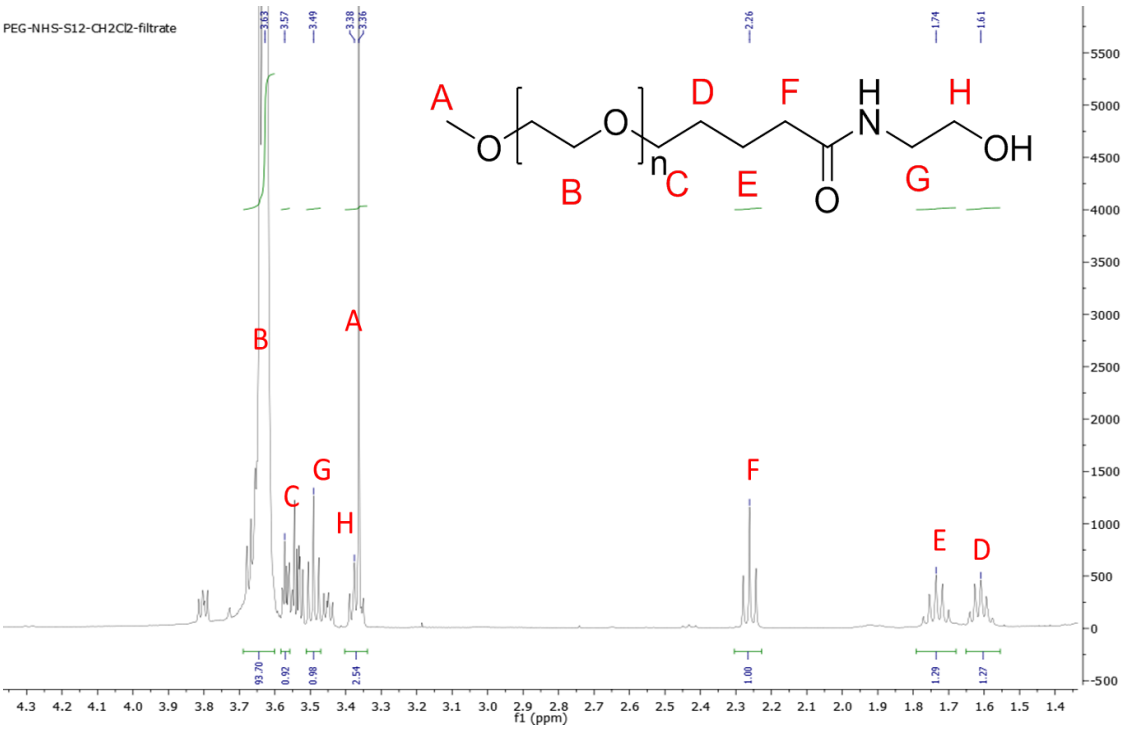
PEG-W –^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.60 (d, *J* = 7.8 Hz, 1H), 7.37 (d, *J* = 8.1 Hz, 1H), 7.18 (t, *J* = 7.6 Hz, 1H), 7.10 (t, *J* = 6.9 Hz, 1H), 7.02 (s, 1H), 3.63 (s, 182H), 3.55 (m, 2H), 3.40 (t, *J* = 6.3 Hz, 2H), 3.38 (s, 3H), 2.97 (t, *J* = 6.6 Hz, 2H), 2.13 (t, *J* = 7.2 Hz, 2H), 1.64 (m, 2H), 1.55 (m, 2H).

PEG-V –^{1}H NMR (400 MHz, $CDCl_3$) δ: 3.61 (s, 182H), 3.46 (t, *J* = 6.1 Hz, 2H), 3.35 (s, 3H), 3.03 (m, 2H), 2.19 (t, *J* = 7.3 Hz, 2H), 1.72 (m, 3H), 1.58 (m, 2H), 0.88 (d, *J* = 6.7 Hz, 6H)

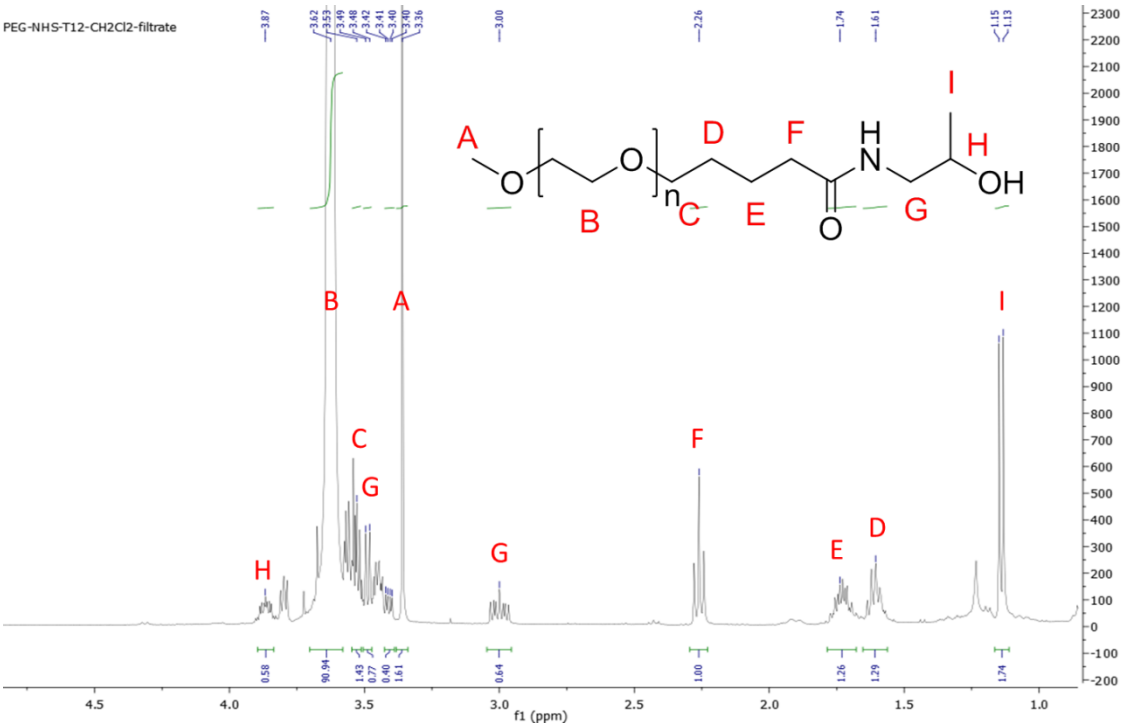
PEG-H –^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.53 (s, 1H), 6.78 (s, 1H), 3.61 (s, 182H), 3.49 (d, *J* = 6.0 Hz, 2H), 3.41 (m, 2H), 3.35 (s, 3H), 2.77 (t, *J* = 6.4 Hz, 2H), 2.17 (t, *J* = 7.3 Hz, 2H), 1.65 (m, 2H), 1.49 (m, 2H)



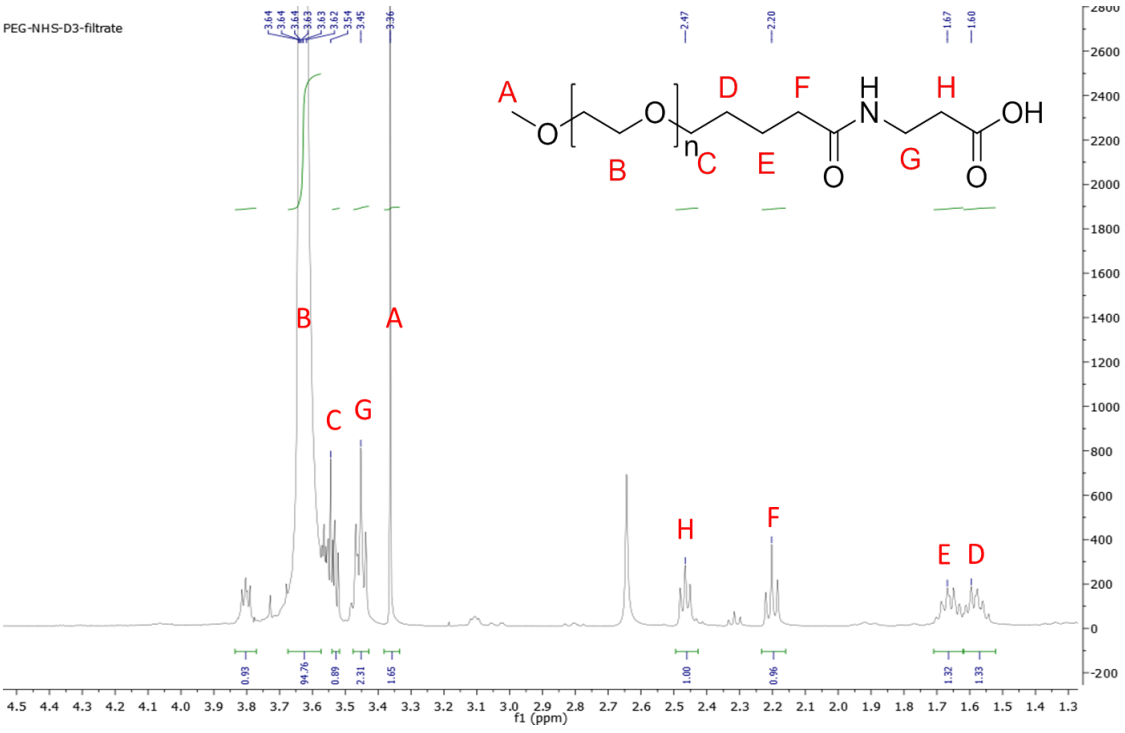
^{1}H NMR spectra of PEG-R



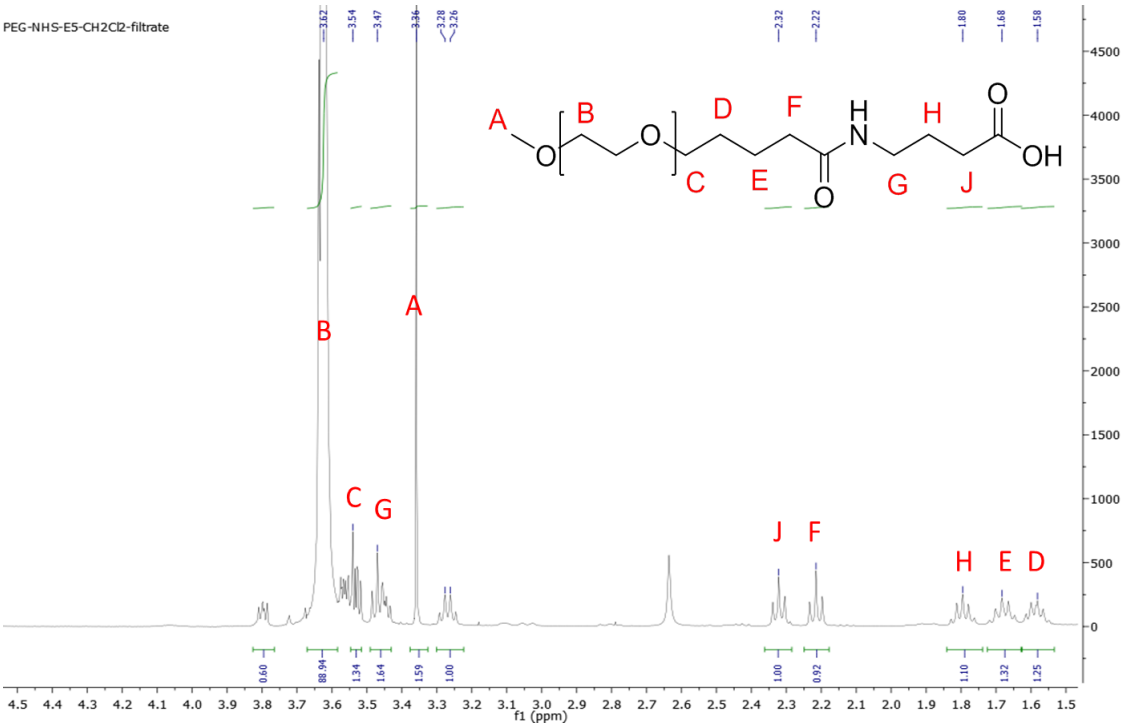
^{1}H NMR of synthesized PEG-S



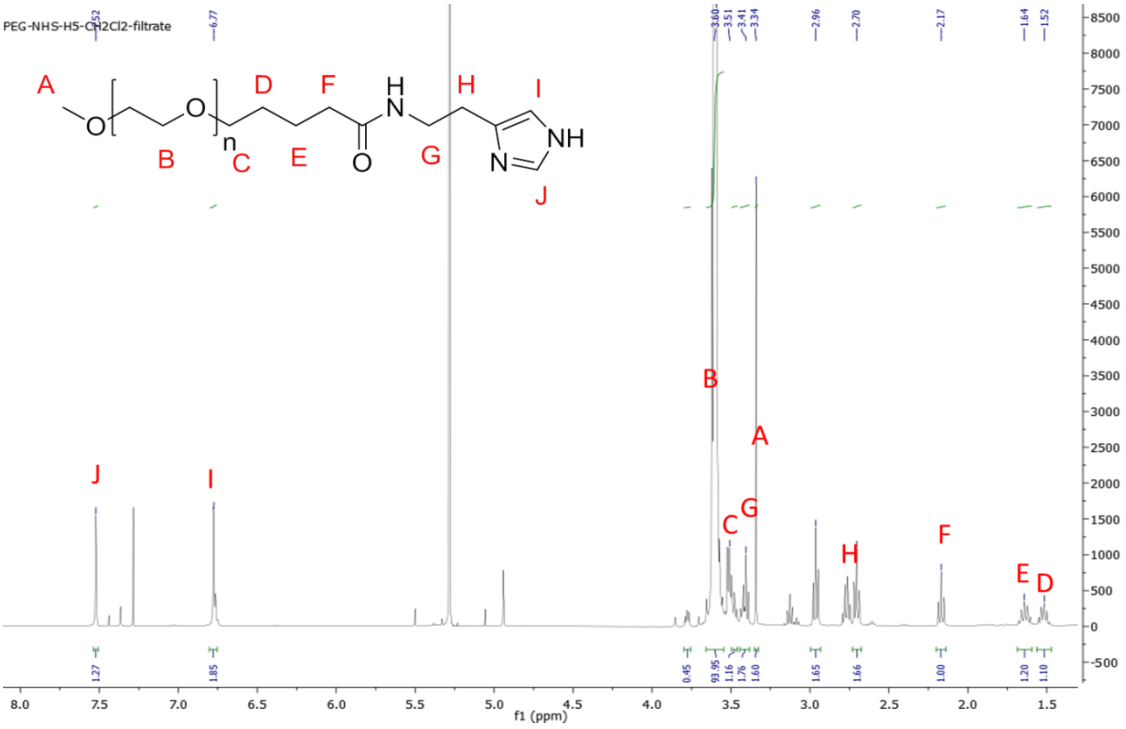
^{1}H NMR of synthesized PEG-T



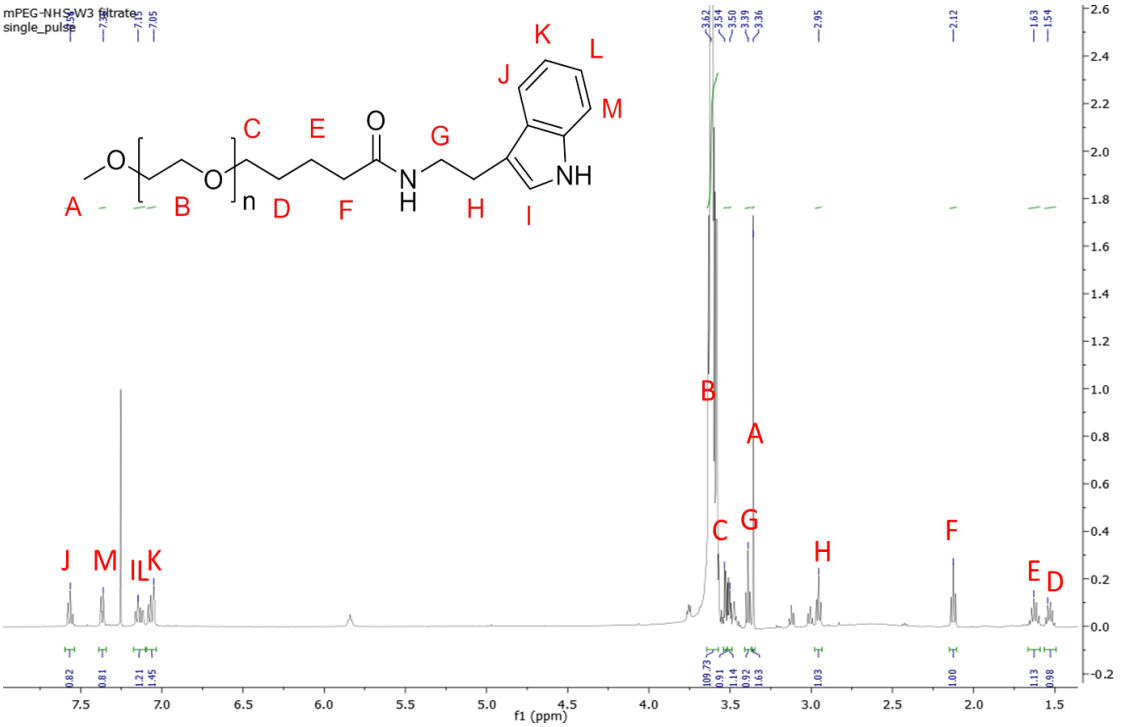
^{1}H NMR of synthesized PEG-D



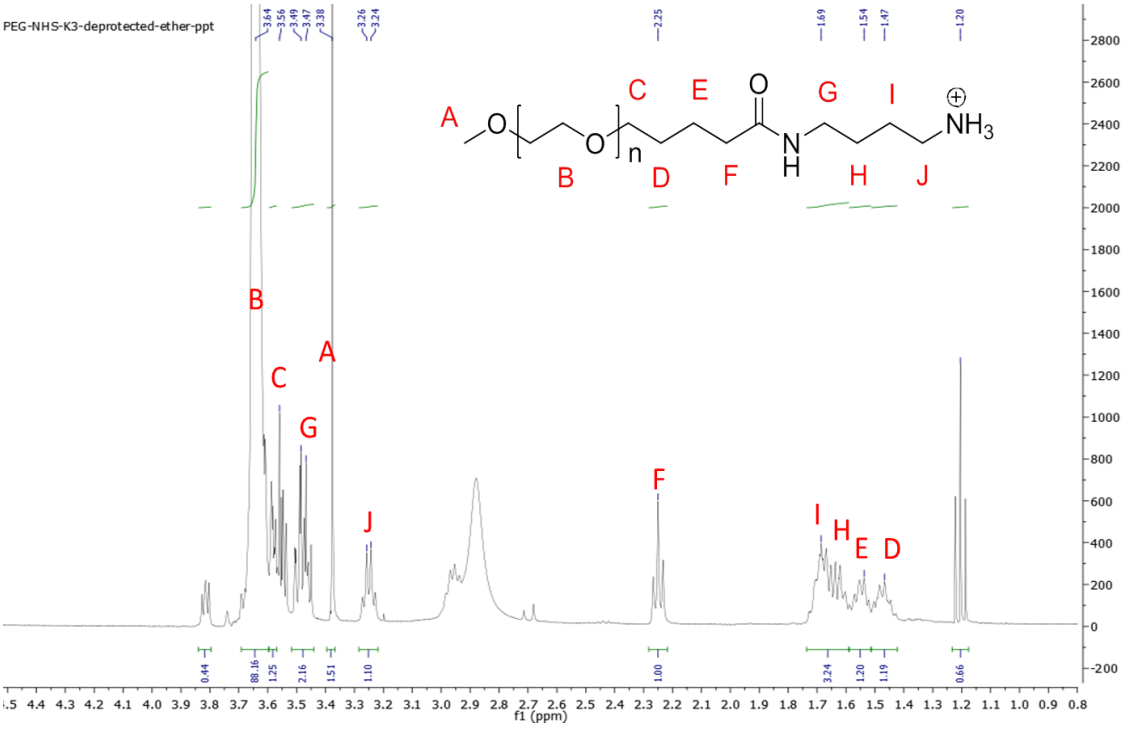
^{1}H NMR of synthesized PEG-E



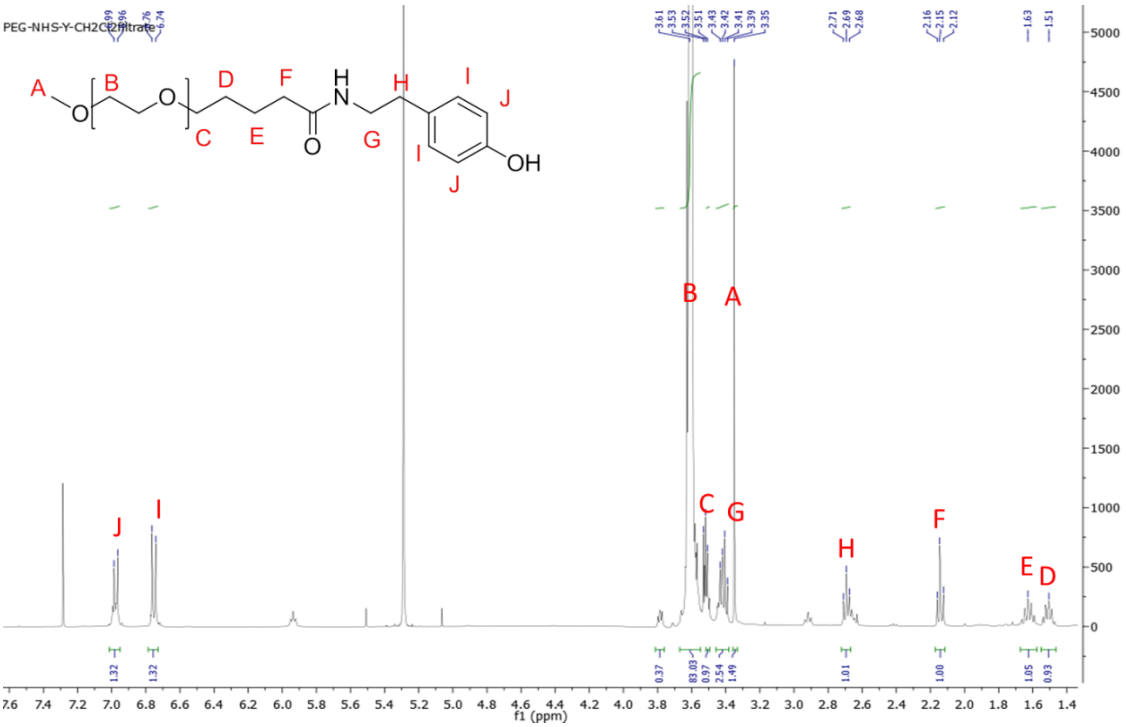
^{1}H NMR of synthesized Peg-H



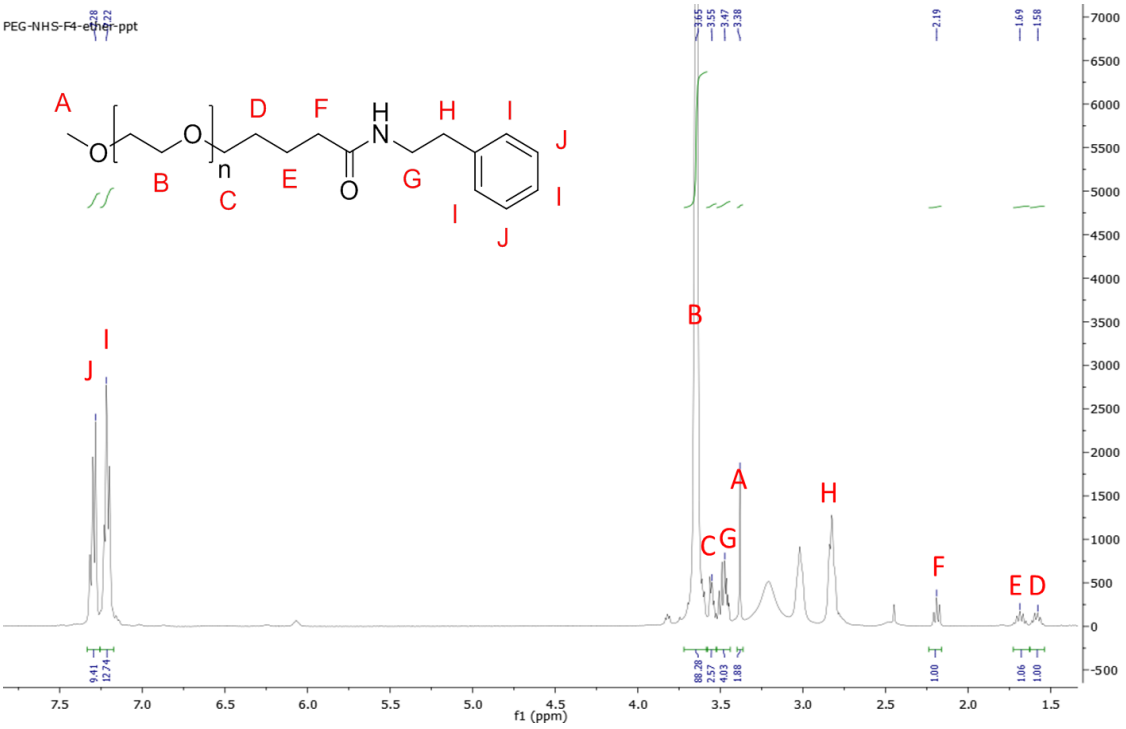
^{1}H NMR of synthesized PEG-W



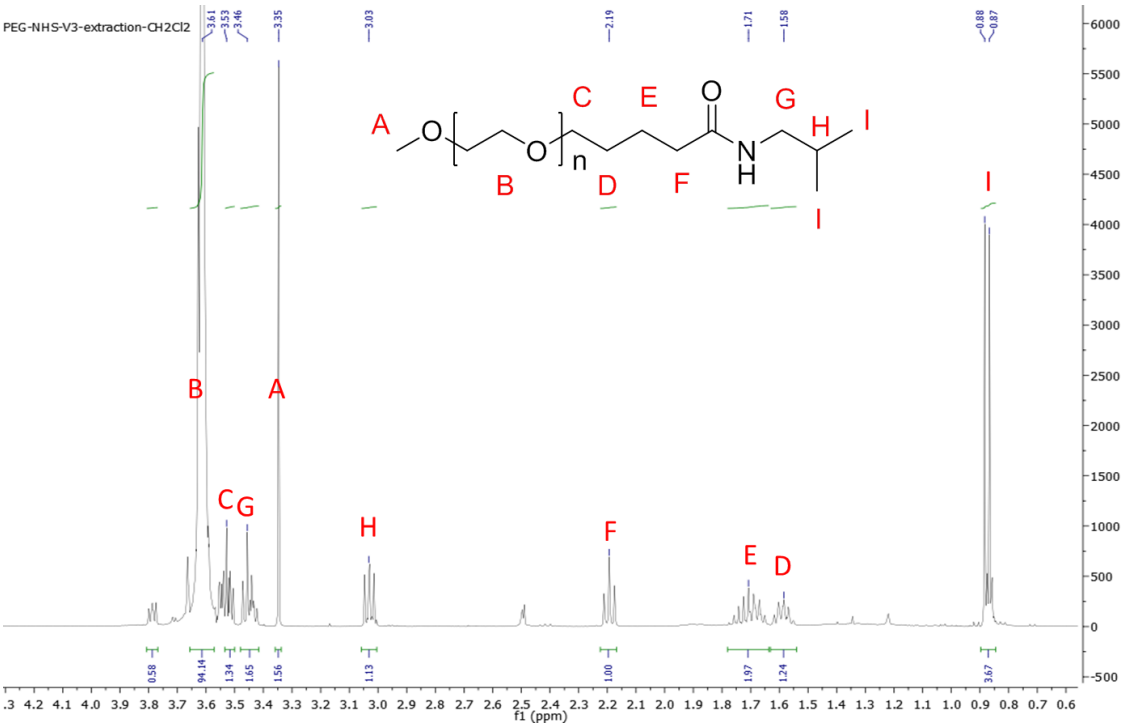
^{1}H NMR of synthesized PEG-K



^{1}H NMR of synthesized PEG-Y



^{1}H NMR of synthesized PEG-F



^{1}H NMR of synthesized PEG-V

Figure S1. ^{1}H NMRs of Synthesized PEG-X Polymers

100:1 PEG-X:Pt Black Polymer Loading			
POLYMER	RATIO	POLYMER	RATIO
BASES		AROMATIC	
PEG-R	87.1	PEG-H	85.7
PEG-K	92.8	PEG-W	93.1
ACIDS		PEG-F	90.7
PEG-D	90.9	PEG-Y	88.9
PEG-E	87.3	ALCOHOLS	
HYDROPHOBIC		PEG-T	87.4
PEG-V	90.1	PEG-S	88.3
m_2PEG	84.6	PEG-OH	87.2

500:1 PEG-X:Pt Black Polymer Loading			
POLYMER	RATIO	POLYMER	RATIO
BASES		AROMATIC	
PEG-R	453	PEG-H	462
PEG-K	466	PEG-W	468
ACIDS		PEG-F	448
PEG-D	450	PEG-Y	423
PEG-E	439	ALCOHOLS	
HYDROPHOBIC		PEG-T	444
PEG-V	426	PEG-S	446
m_2PEG	442	PEG-OH	442

Figure S2. Polymer Loading for the PEG-X polymers on Pt Black.

100:1 PEG-X:Pt Black ORR Measurements					
POLYMER	MASS ACTIVITY (mA/mg)	$E_{1/2}$ (V)	POLYMER	MASS ACTIVITY (mA/mg)	$E_{1/2}$ (V)
Pt black	37.0	0.539			
BASES			AROMATIC		
PEG-R	32.8	0.556	PEG-H	39.3	0.542
PEG-K	38.7	0.603	PEG-W	28.2	0.524
ACIDS			PEG-F	30.4	0.495
PEG-D	46.7	0.551	PEG-Y	35.5	0.5
PEG-E	33.6	0.533	ALCOHOLS		
HYDROPHOBIC			PEG-T	50.7	0.576
PEG-V	26.7	0.488	PEG-S	63.0	0.56
m_2PEG	37.6	0.519	PEG-OH	21.2	0.573

500:1 PEG-X:Pt Black ORR Measurements					
POLYMER	MASS ACTIVITY (mA/mg)	$E_{1/2}$ (V)	POLYMER	MASS ACTIVITY (mA/mg)	$E_{1/2}$ (V)
Pt black	37.0	0.539			
BASES			AROMATIC		
PEG-R	29.8	0.522	PEG-H	24.7	0.593
PEG-K	41.3	0.602	PEG-W	18.8	0.600
ACIDS			PEG-F	22.1	0.585
PEG-D	42.2	0.590	PEG-Y	43.6	0.555
PEG-E	34.0	0.559	ALCOHOLS		
HYDROPHOBIC			PEG-T	68.0	0.601
PEG-V	19.6	0.531	PEG-S	40.8	0.583
m_2PEG	36.5	0.545	PEG-OH	25.4	0.579

1000:1 PEG-T:Pt Black Polymer Loading and ORR Measurements			
Sample	Mass Activity (mA/mg)	$E_{1/2}$ (V)	Polymer Loading
PEG-T	27.8	0.558	733

Figure S3. ORR data for the PEG-X:Pt Black samples at 100:1, 500:1 and 1000:1.