Supporting Information

A Long Wavelength Fluorescent Hydrophilic Copolymer Based on Naphthalenediimide as pH Sensor with Broad Linear Response Range

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1. ^{1}H NMR, ^{13}C NMR and HRMS (TOF-ESI^{+}) spectra of Compound 1

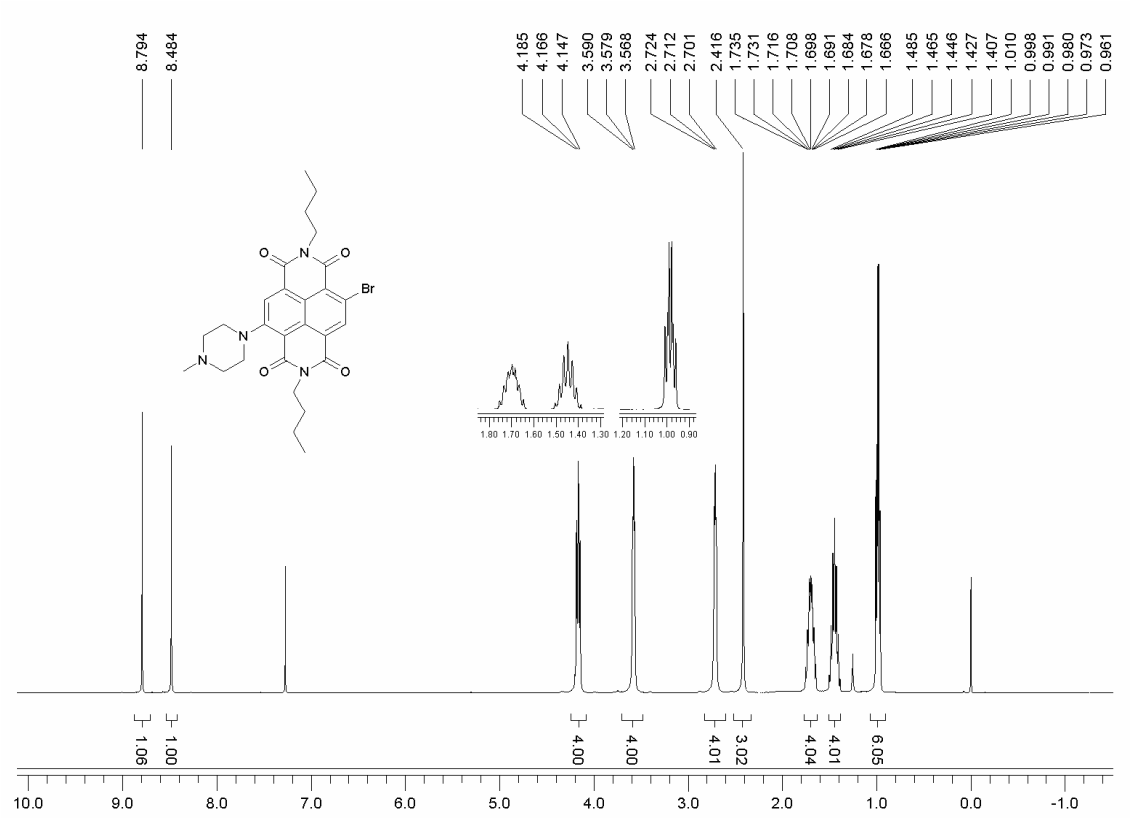


Figure S1. ^{1}H NMR spectum of **Compound 1** (400 MHz, $CDCl_3$, ppm)

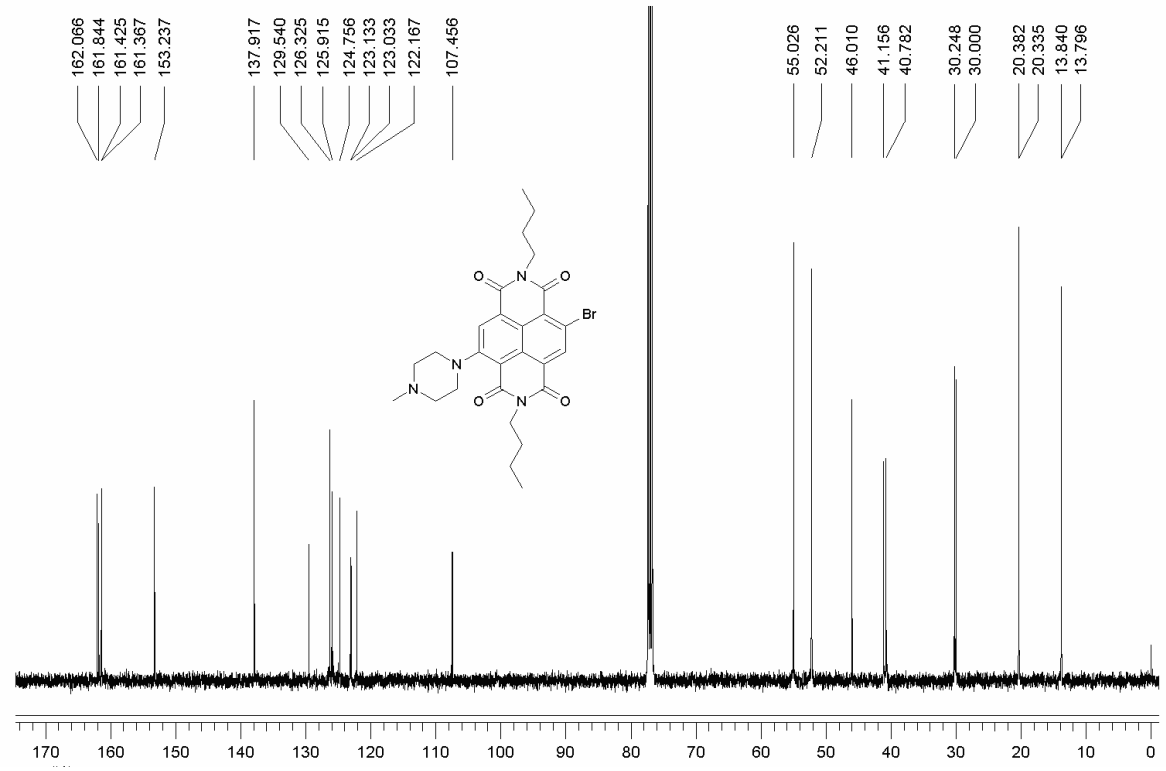


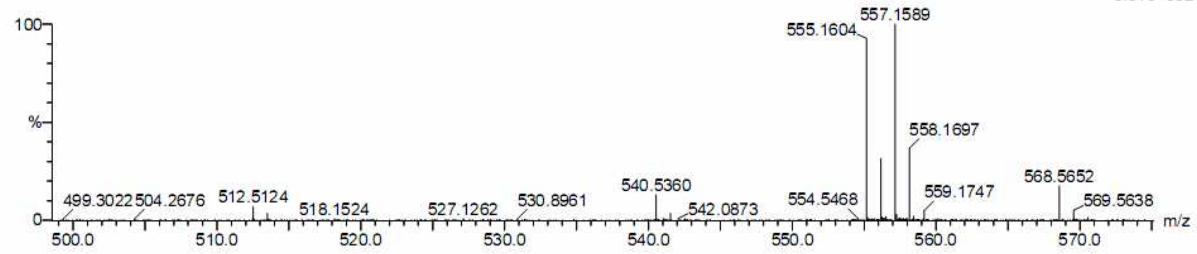
Figure S2. ^{13}C NMR spectum of **Compound 1** (100 MHz, $CDCl_3$, ppm)

Elemental Composition Report Page 1

Single Mass Analysis
Tolerance = 3.0 mDa / DBE: min = -1.5, max = 150.0
Element prediction: Off
Number of isotope peaks used for i-FIT = 2

Monoisotopic Mass, Even Electron Ions
158 formula(e) evaluated with 1 results within limits (all results (up to 1000) for each mass)
Elements Used:
C: 0-27 H: 0-32 N: 0-4 O: 0-4 Br: 0-3

ZHU-WH
ZWH-LXY-21 31 (1.035) Cm (30:33) 1: TOF MS ES+ 5.51e+002



Minimum:				-1.5			
Maximum:		3.0	3.0	150.0			
Mass	Calc. Mass	mDa	PPM	DBE	i-FIT	i-FIT (Norm)	Formula
555.1604	555.1607	-0.3	-0.5	13.5	76.8	0.0	C27 H32 N4 O4 Br

Figure S3. HRMS (TOF-ESI$^+$) spectrum of **Compound 1**

2. ^{1}H NMR, ^{13}C NMR and HRMS (TOF-ESI^{+}) spectra of Compound 2

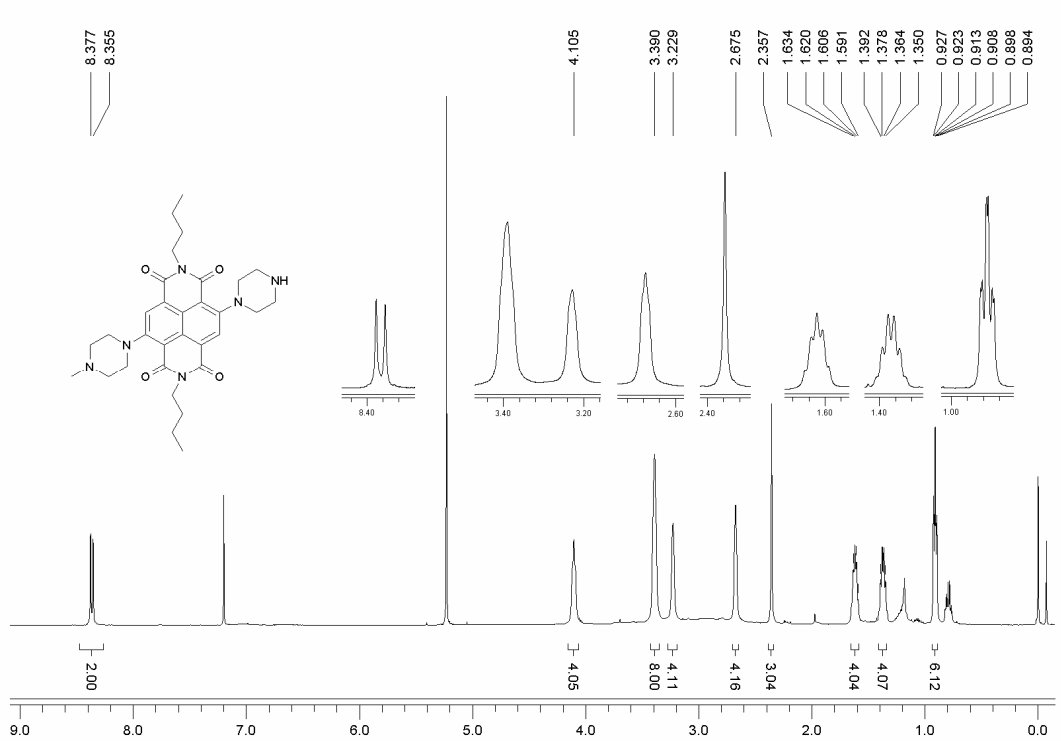


Figure S4. ^{1}H NMR spectum of **Compound 2** (500 MHz, $CDCl_3$, ppm). Note: the signal at 5.3 ppm is from the trace of CH_2Cl_2.

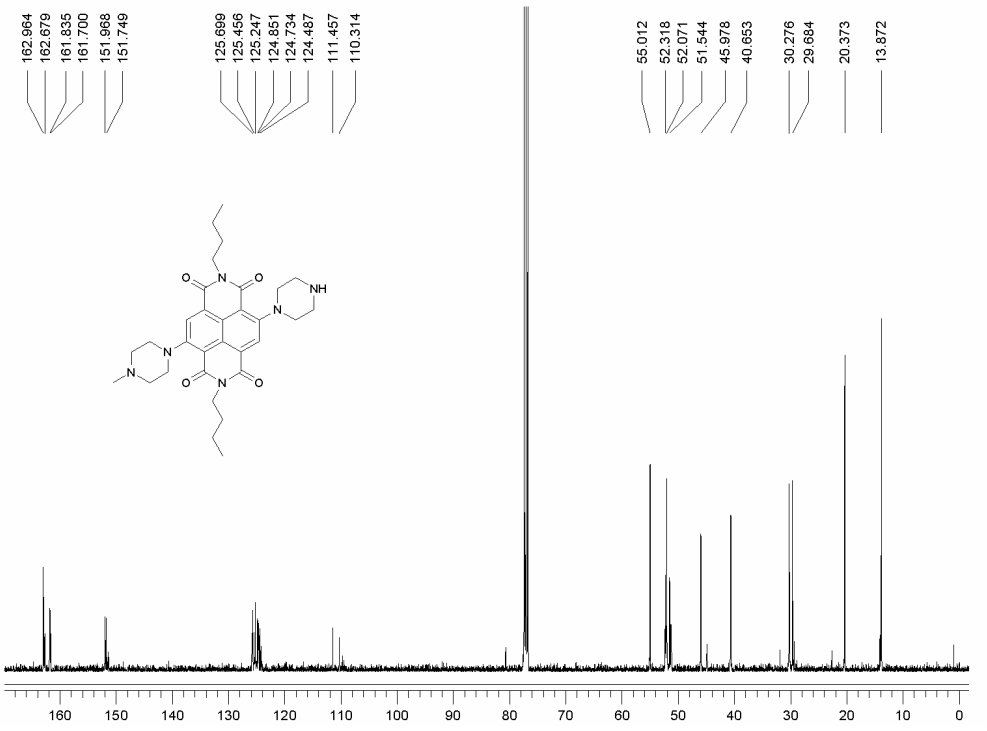
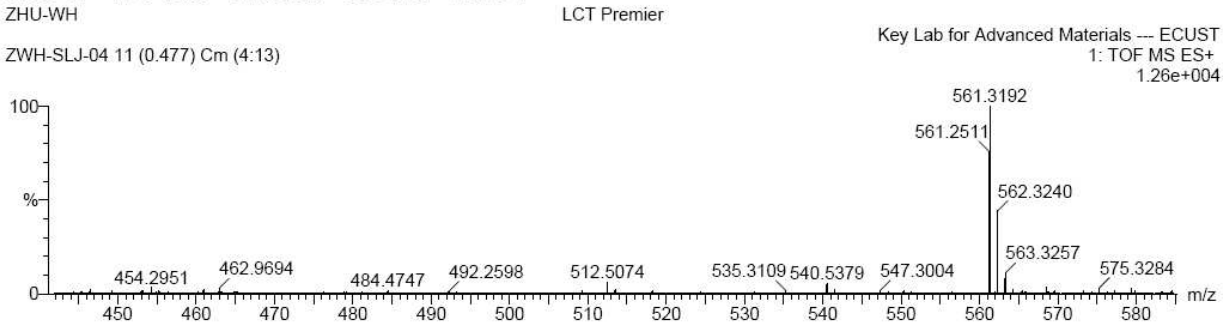


Figure S5. ^{13}C NMR spectum of **Compound 2** (100 MHz, $CDCl_3$, ppm)

Single Mass Analysis
Tolerance = 3.0 mDa / DBE: min = -1.5, max = 50.0
Element prediction: Off
Number of isotope peaks used for i-FIT = 3

Monoisotopic Mass, Even Electron Ions
1510 formula(e) evaluated with 3 results within limits (up to 1 best isotopic matches for each mass)
Elements Used:
C: 30-31 H: 0-1000 N: 0-200 O: 0-200 Na: 0-1



Minimum:				-1.5			
Maximum:		3.0	50.0	50.0			
Mass	Calc. Mass	mDa	PPM	DBE	i-FIT	i-FIT (Norm)	Formula
561.3192	561.3189	0.3	0.5	14.5	343.7	0.0	C31 H41 N6 O4

Figure S6. HRMS (TOF-ESI$^+$) spectrum of **Compound 2**

3. ^{1}H NMR, ^{13}C NMR and HRMS (TOF-ESI^{+}) spectra of monomer NDI

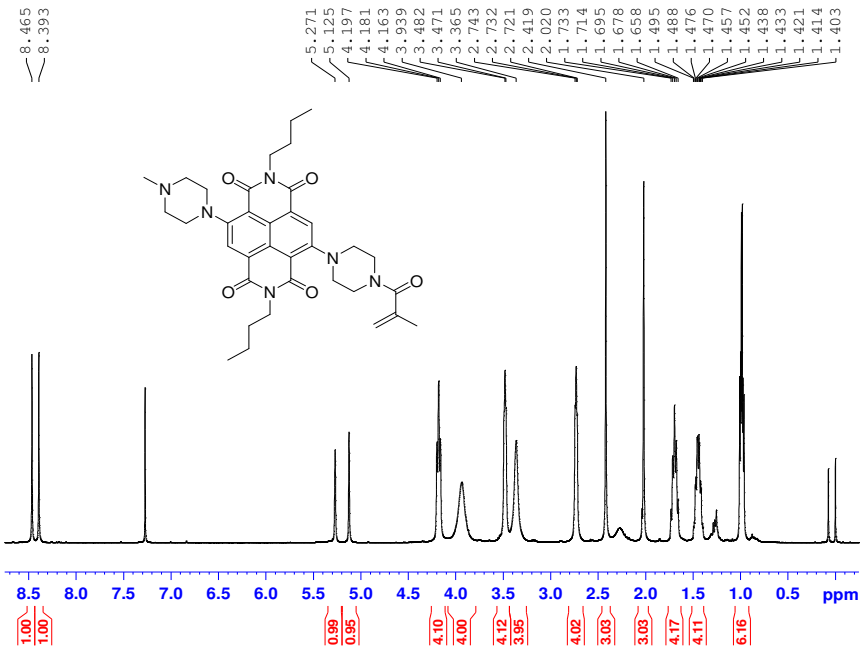


Figure S7. ^{1}H NMR spectum of **monomer NDI** (400 MHz, $CDCl_3$, ppm)

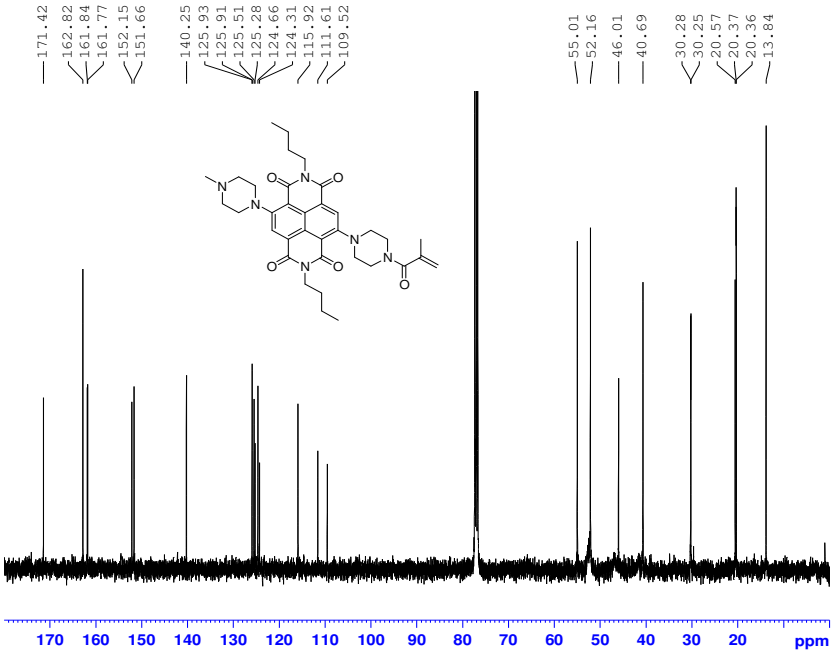


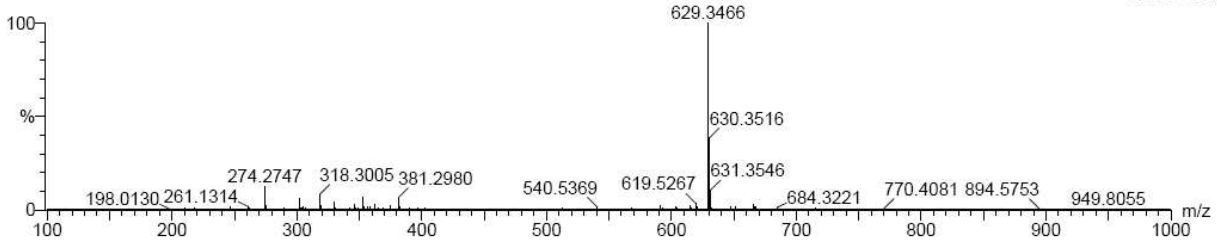
Figure S8. ^{13}C NMR spectum of **monomer NDI** (100 MHz, $CDCl_3$, ppm)

Elemental Composition Report **Page 1**

Single Mass Analysis
Tolerance = 3.0 mDa / DBE: min = -1.5, max = 50.0
Element prediction: Off
Number of isotope peaks used for i-FIT = 3

Monoisotopic Mass, Even Electron Ions
921 formula(e) evaluated with 1 results within limits (up to 1 best isotopic matches for each mass)
Elements Used:
C: 35-35 H: 0-1000 N: 0-200 O: 0-200

ZHU-WH LCT Premier
Key Lab for Advanced Materials --- ECUST
ZWH-SLJ-05-1 44 (1.321) Cm (43:47) 1: TOF MS ES+
5.96e+004



Minimum:				-1.5			
Maximum:		3.0	50.0	50.0			
Mass	Calc. Mass	mDa	PPM	DBE	i-FIT	i-FIT (Norm)	Formula
629.3466	629.3451	1.5	2.4	16.5	319.9	0.0	C35 H45 N6 O5

Figure S9. HRMS (TOF-ESI$^+$) spectrum of **monomer NDI**

4. Characterization of P(NDI-HEMA) and the molar ratio of NDI and HEMA units in the copolymer composition

The value of m / n = 1100 / 1 in P(NDI-HEMA) can be calculated standard Job's plot of NDI absorption spectra in ethanol solution.

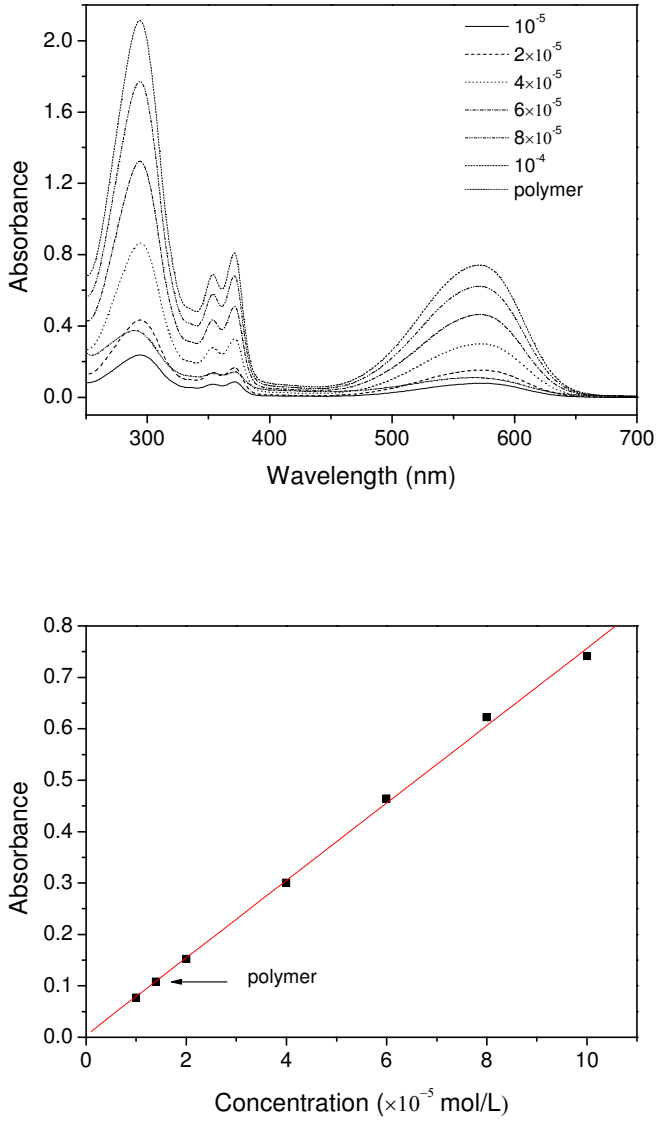


Figure S10. Absorption spectra of monomer NDI in ethanol solution and the linear fit of absorbance at λ_{abs} = 570 nm. Absorption spectroscopic analyses confirmed the ratio of NDI monomer to HEMA monomer for about 1:1100 in copolymer P(NDI-HEMA).