Supplementary Information

for

Synthesis of poly(*p*-phenylene) containing rhodamine 6G derivative for detection of Fe (III) in organic and aqueous media

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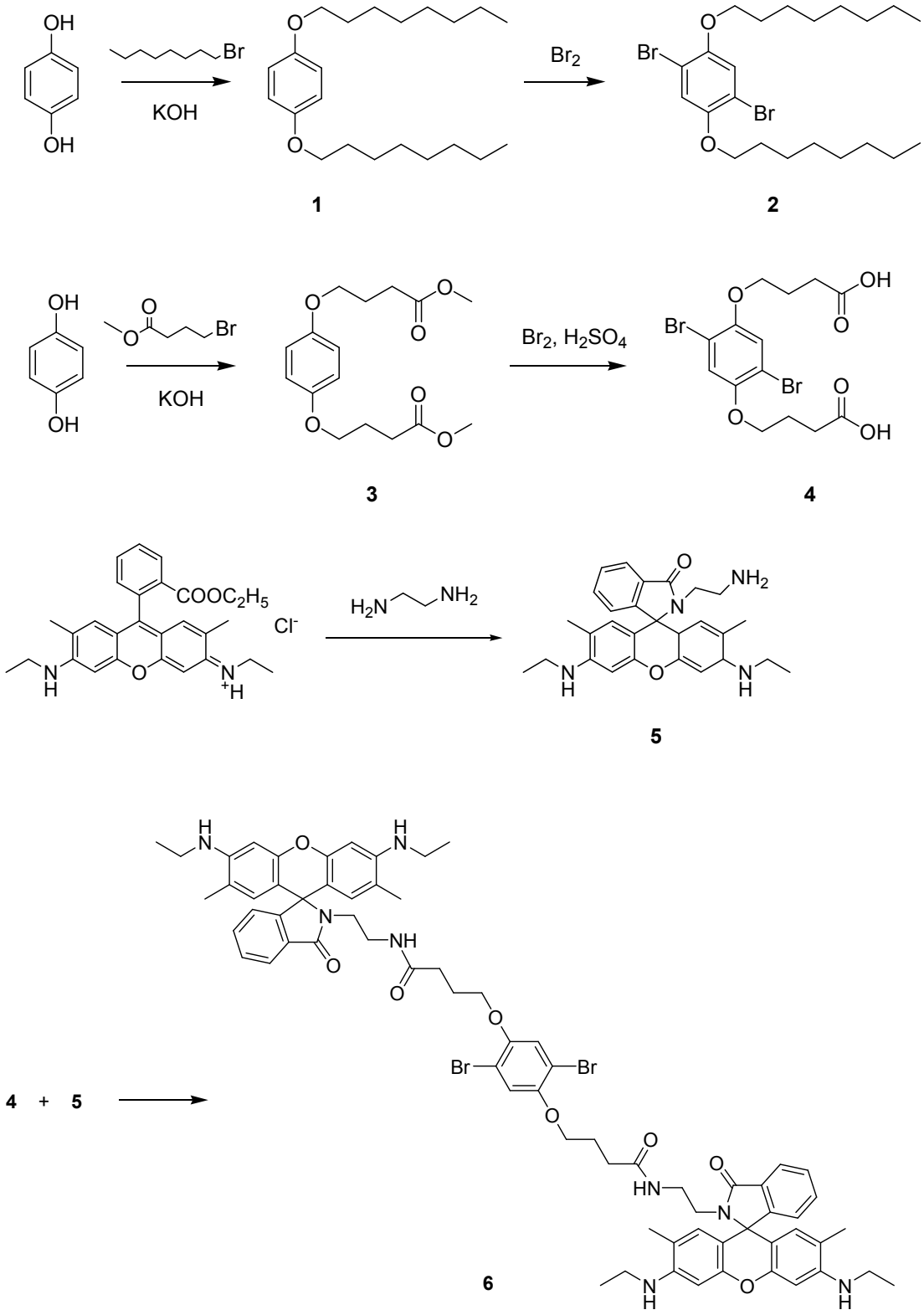
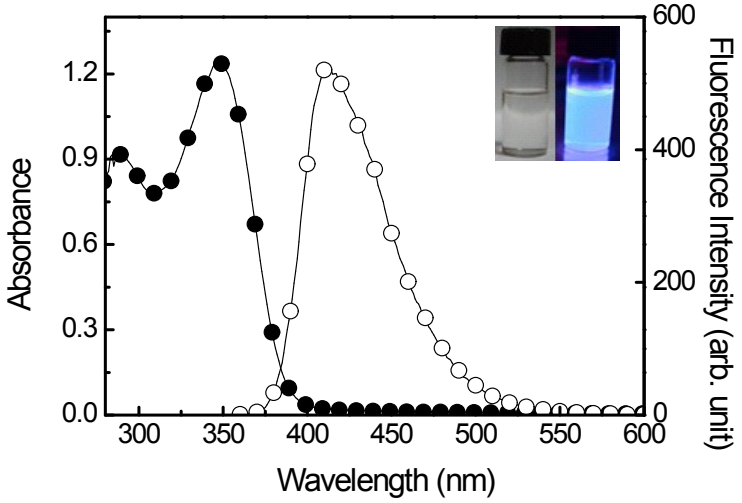
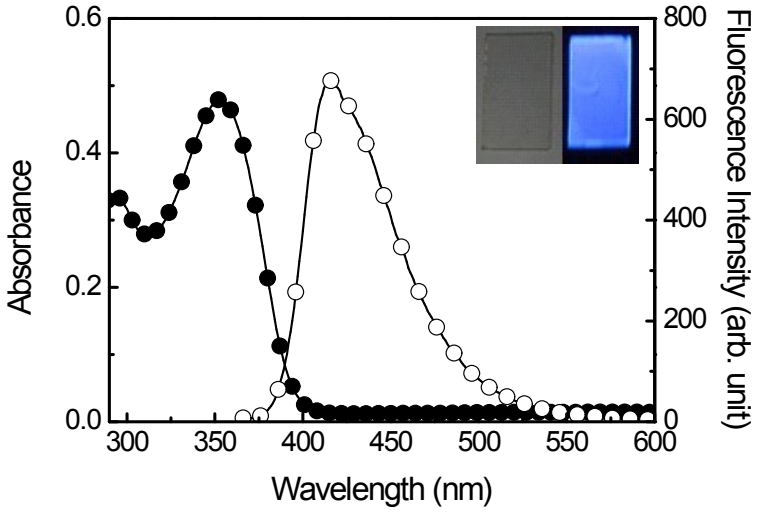


Scheme S1. Synthesis of monomers.

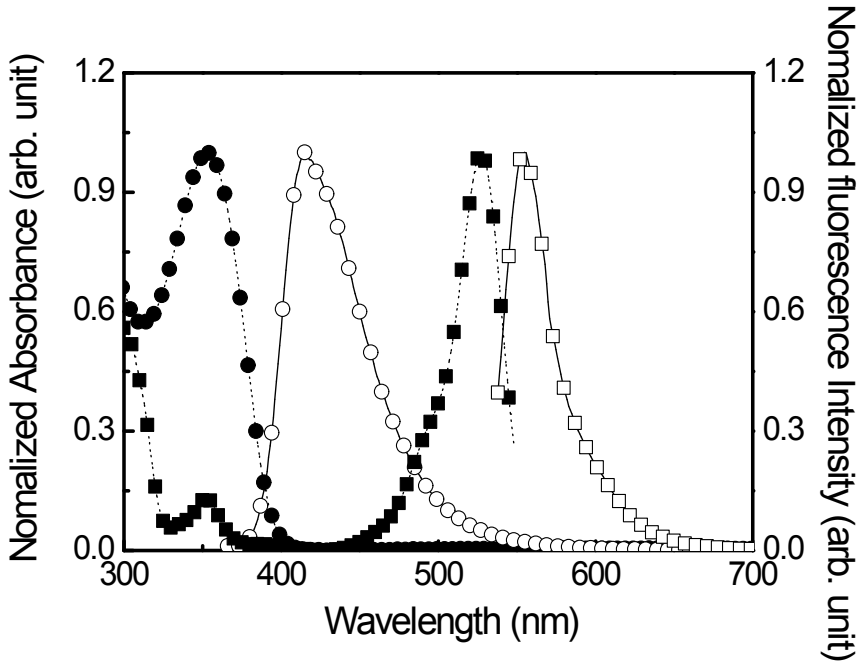


(a)

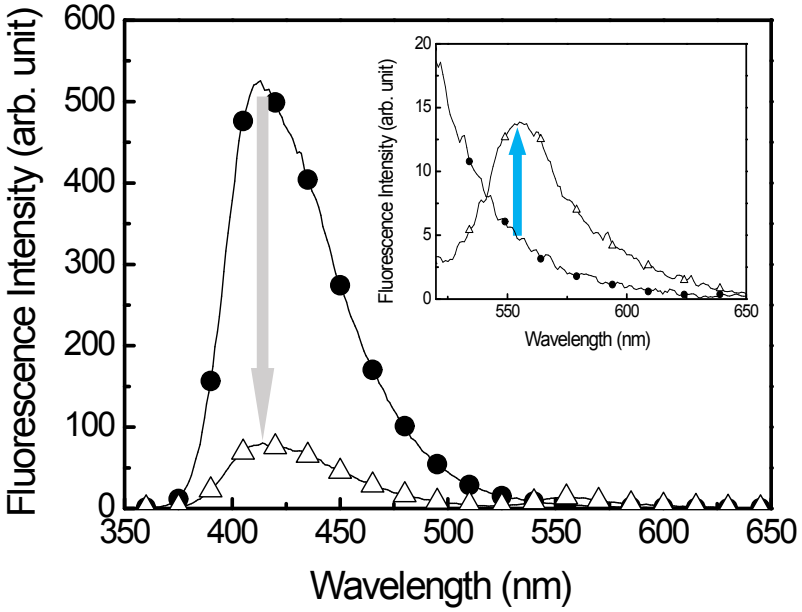


(b)

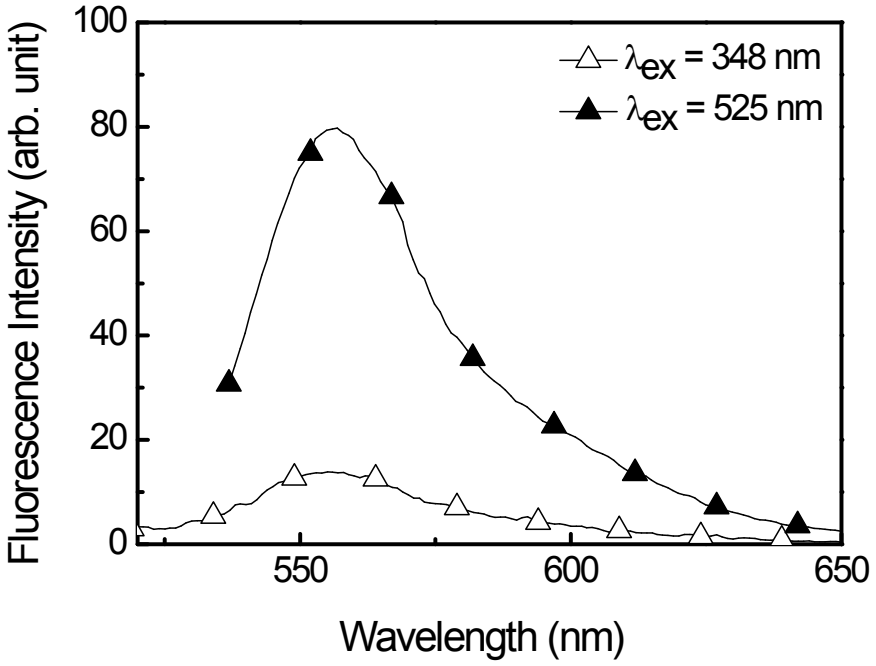
Figure S1. UV-vis (●) and fluorescence (○) spectra of R6G-PPP (a) in THF solution (0.01 mg/mL) and in the film (Excitation wavelength 354 nm). Inset photographs were taken under ambient (left) and UV light (right; 365 nm).


Nomalized Absorbance (arb. unit)
Nomalized fluorescence Intensity (arb. unit)
Wavelength (nm)
0.0
0.3
0.6
0.9
1.2
300
400
500
600
700

(a)

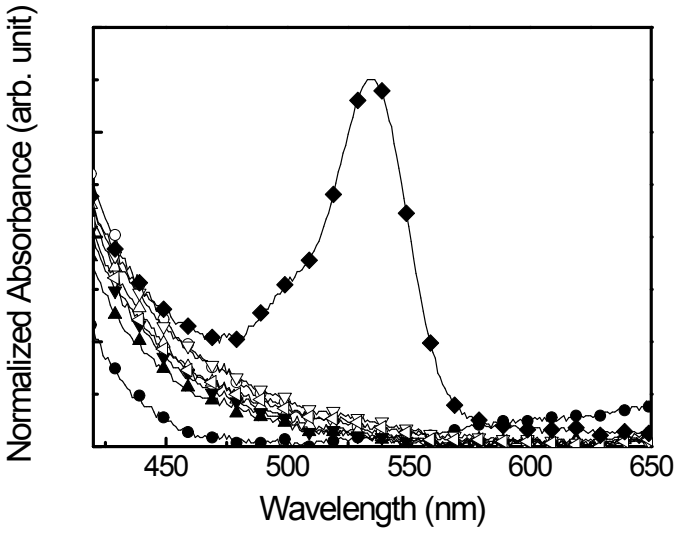

Fluorescence Intensity (arb. unit)
Wavelength (nm)
0
100
200
300
400
500
600
350
400
450
500
550
600
650
Fluorescence Intensity (arb. unit)
Wavelength (nm)
0
5
10
15
20
550
600
650

(b)

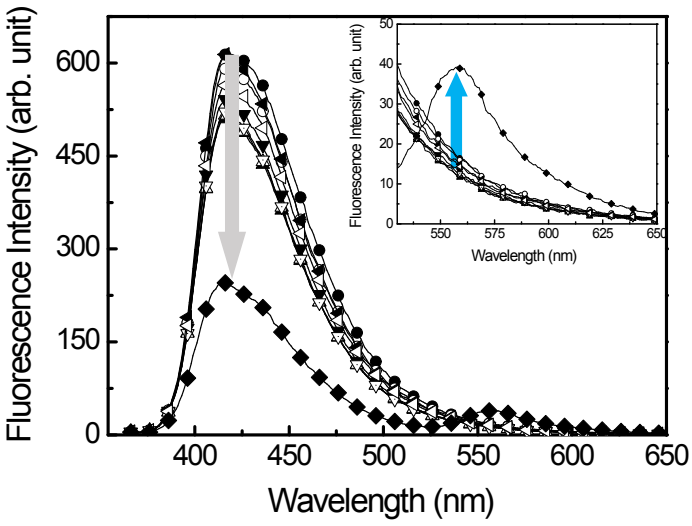


(c)

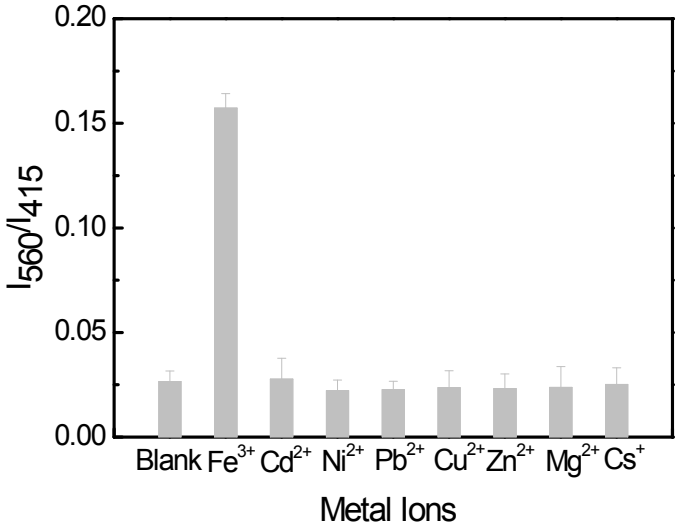
Figure S2. (a) UV-vis (dotted) and fluorescence (solid) spectra of R6G-PPP film (○, ●) and ring-opened form of R6G (□, ■). For ring-opening of R6G moiety, an acid was used. (b) Changes in fluorescence spectra of R6G-PPP in THF solution (0.01 mg/mL) in the absence (●) and presence of Fe (III) (△). [Fe (III)] = 5.0 x 10^{-3} M. Excitation wavelength 348 nm. Inset demonstrates partial fluorescence spectra from 500 nm to 600 nm for the clear increase in the fluorescence intensity. (c) Partial fluorescence spectra of R6G-PPP in THF solution (0.01 mg/mL) in the presence of Fe (III) ion upon excitation at 348 nm (△) and 525 nm (▲).


Normalized Absorbance (arb. unit)
450
500
550
600
650
Wavelength (nm)

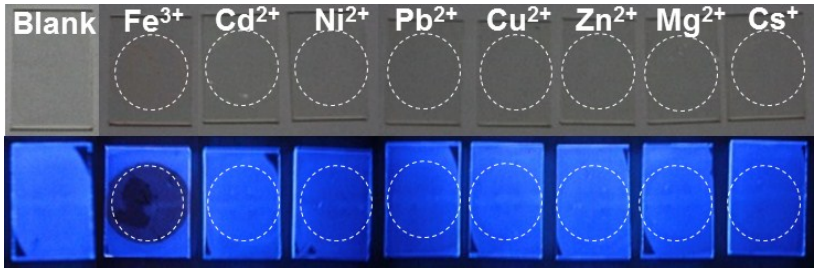
(a)


Fluorescence Intensity (arb. unit)
600
450
300
150
0
400
450
500
550
600
650
Wavelength (nm)
Fluorescence Intensity (arb. unit)
50
40
30
20
10
0
550
575
600
625
650
Wavelength (nm)

(b)



(c)



(d)

Figure S3. Changes in (a) UV-vis and (b) fluorescence spectra of R6G-PPP film upon dropping various metal ion solutions. [Metal ions] = 0.01 M; Excitation wavelength λ_{ex} = 354 nm; exposure time: 1 h. Blank (●); Cs^{+} (○); Mg^{2+} (▲); Zn^{2+} (△); Cu^{2+} (▼); Pb^{2+} (▽); Ni^{2+} (◀); Cd^{2+} (◁); Fe^{3+} (◆). The inset shows partial fluorescence spectra. (c) Variation in the fluorescence intensity ratio (I_{560}/I_{415}) in the dropping site of metal ion solution. I_{560} and I_{415} correspond to fluorescence intensity at 560 nm and 415 nm,

respectively. (d) Photographic images of R6G-PPP film after dropping a solution of various metal ions, taken under ambient (upper) and 365 nm UV light (bottom). White dotted circles in images indicate the dropping area of metal ion solutions.

Table S1. Comparison of different methods for fluorescence detection of Fe (III) ion

Type	Methods	LOD	Reference
Solid	Electrospun PVA fibers	1.0×10^{-6} M	Ref 1
	PVA film	1.0×10^{-6} M	Ref 2
	R6G-PPP strip	1.0×10^{-6} M	This work
Solution	Graphene quantum dots	7.22×10^{-6} M	Ref 3
	Cellulose nanocrystals	1.0×10^{-6} M	Ref 4
	Schiff base molecule	2.95×10^{-6} M	Ref 5
	Conjugated polymer solution	3.0×10^{-7} M	Ref 6

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