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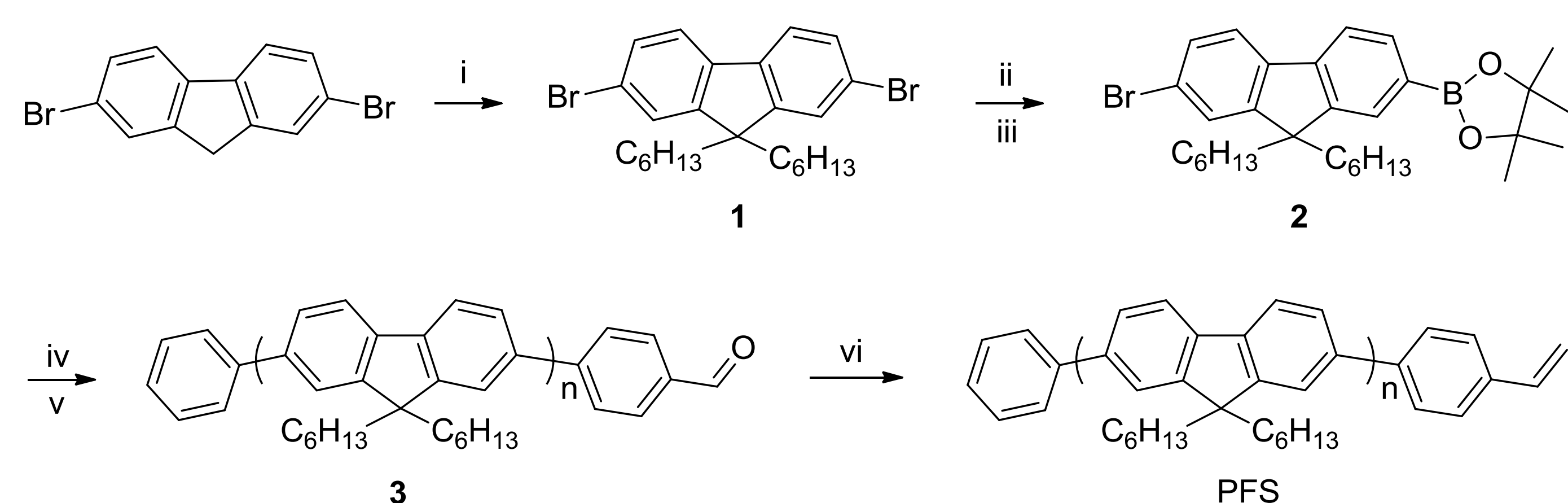
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## Introduction

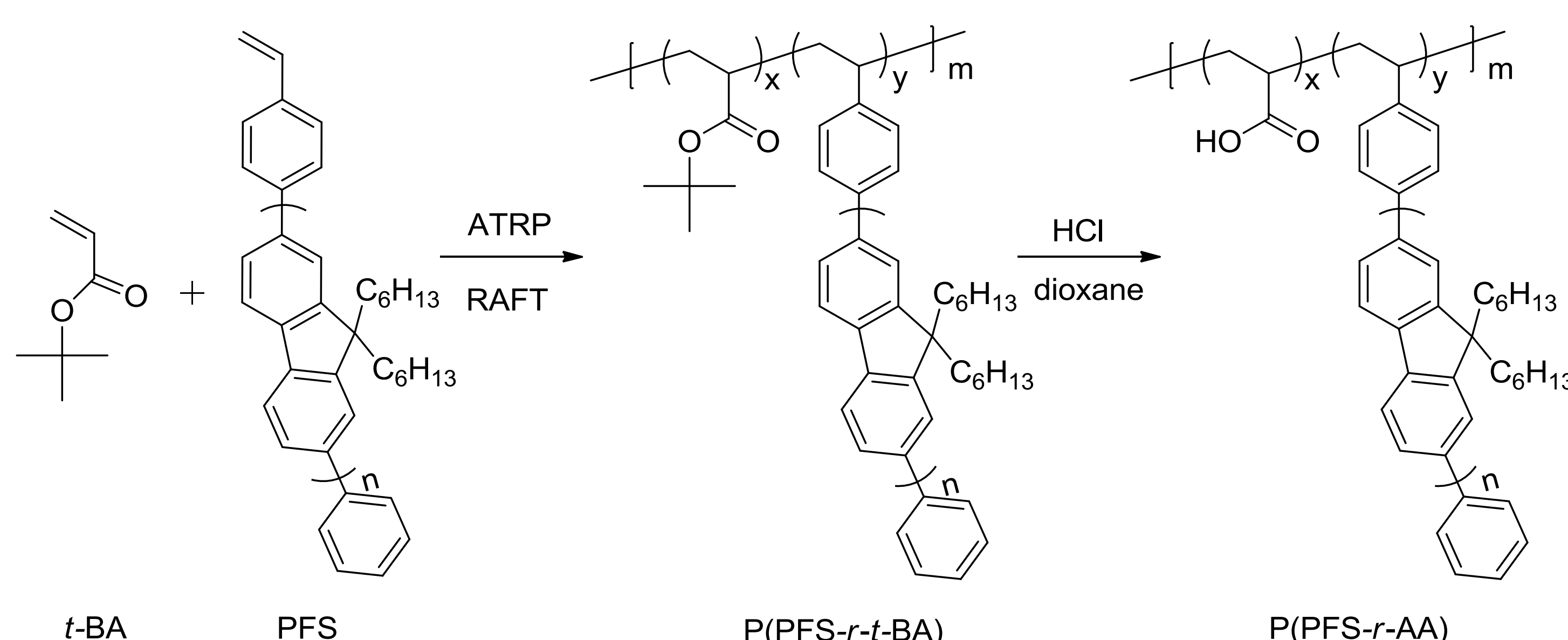
Polyfluorene (PF) and their derivatives are considered to be of special interest due to its thermal/chemical stability, high fluorescence quantum yield and significant charge carrier mobility.<sup>1</sup> Vinyl conjugated polymers supply excellent solubility and easily produce into uniform films for device applications. Furthermore, it is feasible to design macromolecular architectures or change the composition to adjust their electronic and optoelectronic properties. Here we report a styrene type macro-monomer containing polyfluorene pendent group (PFS, Scheme 1). Copolymers of PFS with *t*-butyl acrylate were synthesized by both RAFT and ATRP polymerization methods (Scheme 2). After hydrolysis, the amphiphilic copolymers self-assembled into photoluminescent nanoparticles in aqueous solution. When doped with selected dyes, the nanoparticles emitted light with tunable colors, as well as white, via Förster energy transfer from the excited pendent polyfluorene groups.<sup>2</sup>

## Results and Discussion

### 1.Synthesis



**Scheme 1.** Synthesis of *p*-[poly(9,9-dihexylfluorene-2,7-diyl)] styrene (PFS)



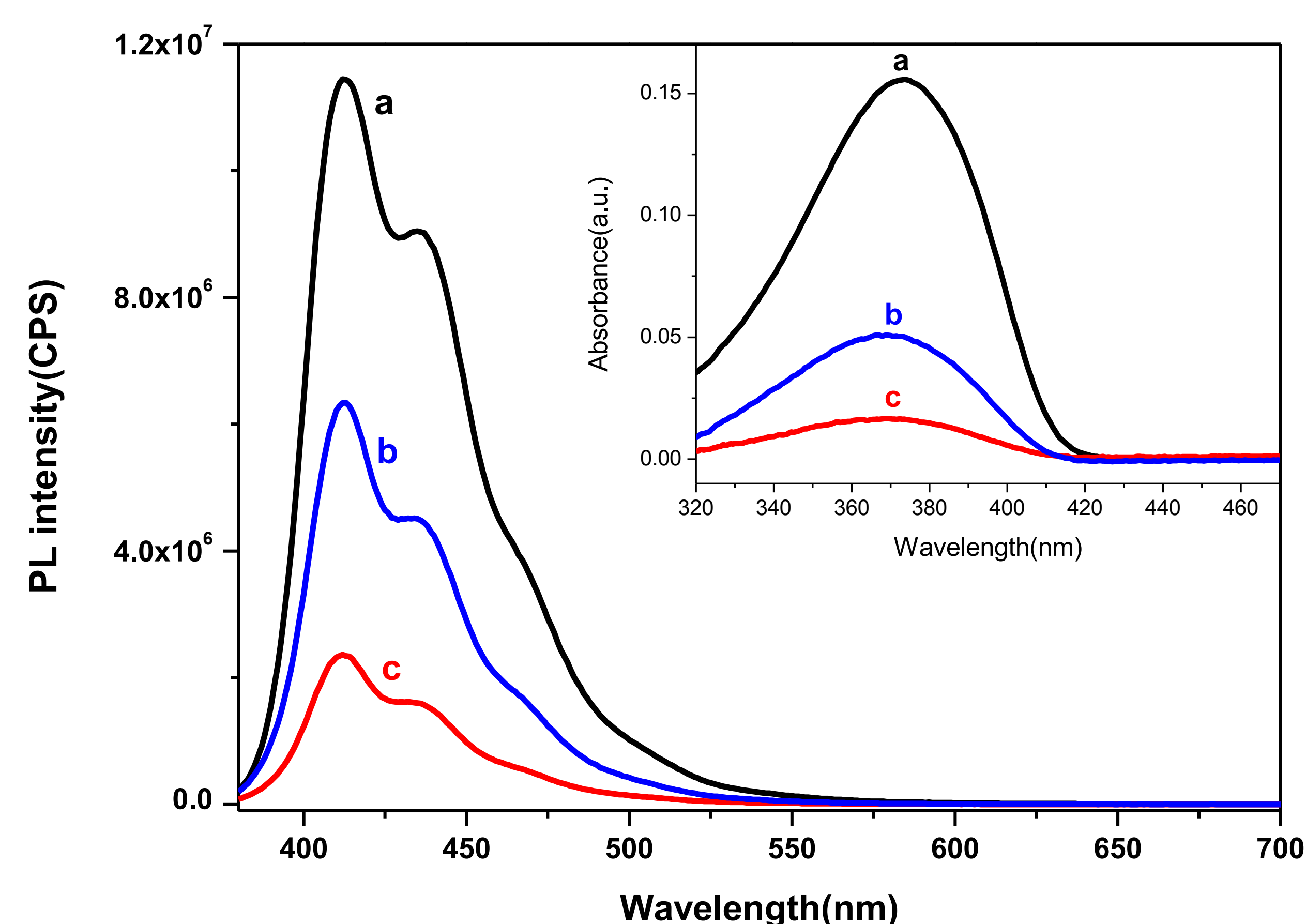
**Scheme 2.** Synthesis of P(PFS-*r*-*t*-BA) and P(PFS-*r*-AA)

**Table 1.** Polymerizations of PFS and *t*-BA via RAFT and ATRP

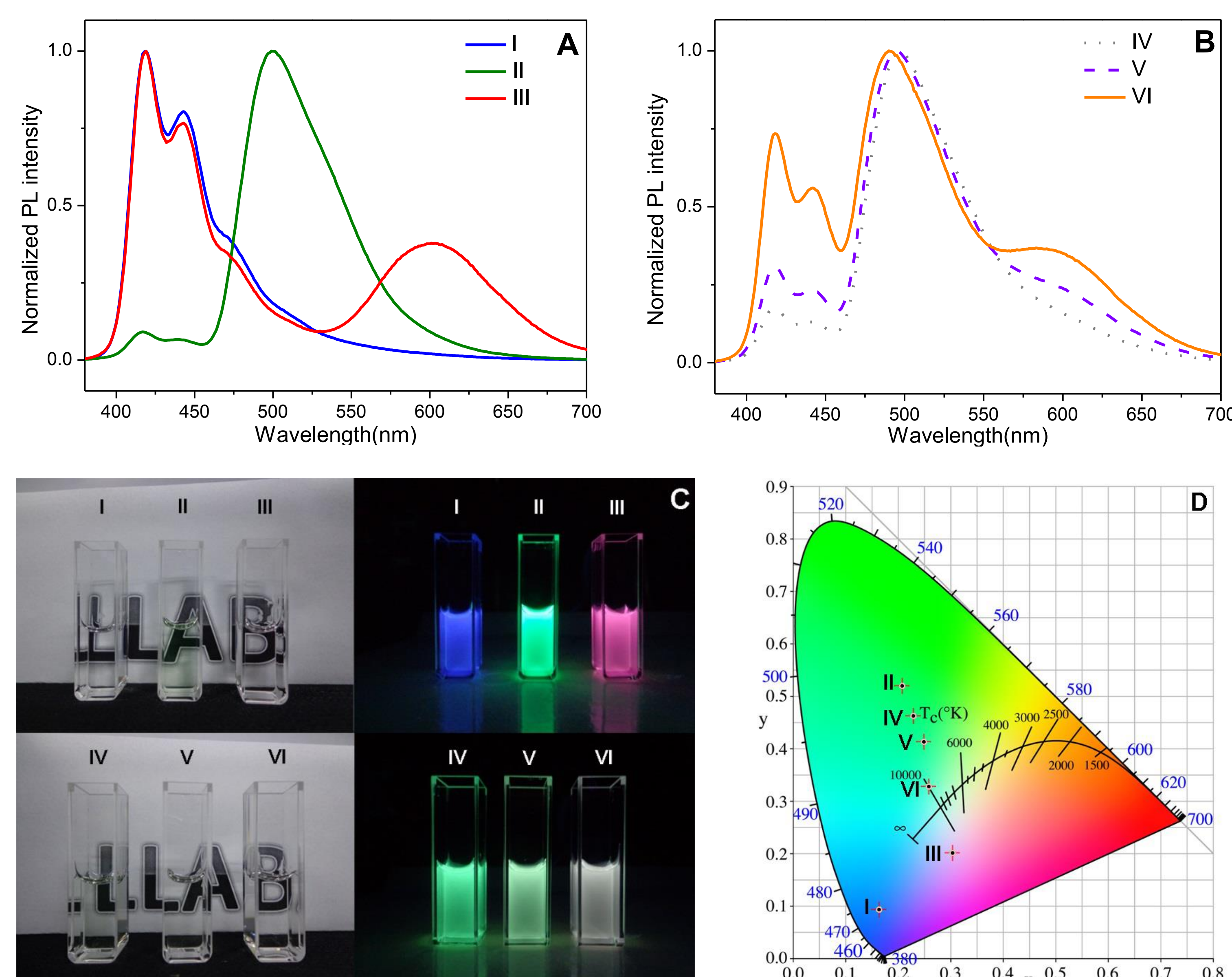
Sample	[ <i>t</i> -BA] <sub>0</sub> /[PFS] <sub>0</sub> /[CDT] <sub>0</sub>	[ <i>t</i> -BA] <sub>0</sub> /[PFS] <sub>0</sub> /[EBIB] <sub>0</sub>	Time (h)	M <sub>n,SEC</sub> <sup>a</sup>	PDI <sup>a</sup>
P1	400:4:1	-	24	39000	1.25
P2	170:2.5:1	-	12	14000	1.14
P3	-	500:5:1	4	31000	1.28

<sup>a</sup> Measured by SEC

### 2.Emission and absorption properties

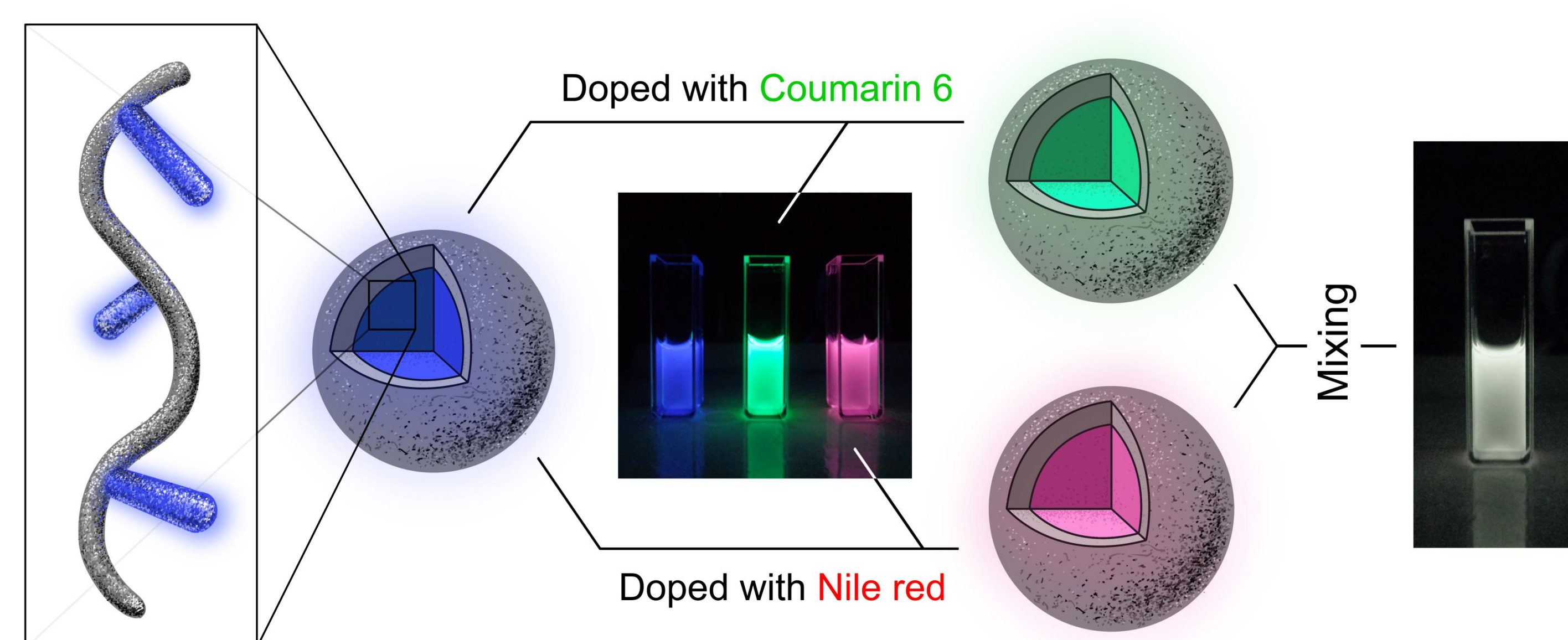


**Figure 1.** UV-Vis and emission spectra of PFS (a), P2 (b) and P1 (c) ( $\lambda_{\text{ex}}$ =370 nm).



**Figure 2.** A and B: PL spectra of PB (I), PG (II), PR (III) NPs, and mixtures of PG and PR with ratios of 1:3 (IV), 1:1 (V) and 3:1 (VI) in aqueous media under excitation at 370 nm. C: Photographs of solution mixtures I-VI under sunlight (left) and UV lamp of 365 nm (right). D: The corresponding coordinates of NP mixtures on a CIE1931 diagram.

## Conclusions



A vinyl-functionalized polyfluorene macromonomer was synthesized and copolymerized with *t*-butyl acrylate via both RAFT and ATRP methods to give random copolymers. After acid hydrolysis and dispersion into water, the resulting PB nanoparticles were characterized by DLS, TEM and fluorescence measurements. By doping the PB with various dyes the resulting NPs could emit predominantly green (PG) and red (PR) light. By mixing the two NPs, solutions with a white fluorescence were obtained.

## Acknowledgement

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## References

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- 2.C. Deng, P. Jiang, X. Shen, J. Ling and T. E. Hogen-Esch, *Polymer Chemistry*, 2014, **5**, 5109-5115.