

Supplementary Materials

Table S1. Abbreviations, commercial sources, and melting points of the raw materials used in this study.

Raw material	Source	Melting point (°C)
Anthraquinone	Wako Pure Chemical	286 ^a
Aniline	Koso Chemical	---
Anilinium chloride	Wako Pure Chemical	---
1,2,4,5-Tetramethylbenzene (Durene)	Tokyo Chemical Industry (TCI)	80 ^a
Bromine	Koso Chemical	---
<i>N</i> -Phenylmaleimide	TCI	87 ^a
1- <i>exo</i> ,2- <i>exo</i> ,4- <i>exo</i> -cyclohexanetricarboxylic acid (HTCA)	Mitsubishi Chemical or Iwatani Industrious Gases	188 ^b
4,4'-Biphenol (44'BP)	TCI	281 ^a
Methylhydroquinone (MHQ)	TCI	126 ^a
4,4'-Bicyclohexanol (44'BCH) (mixture of isomers)	Iwatani Industrious Gases	218 ^a

^a Data from the safety data sheets.

^b Data determined from the endothermic peak temperature in DSC thermogram recorded at a heating rate of 5 °C/min.

Table S2. Abbreviations, sources, vacuum-drying conditions, and melting points of the commercially available monomers and standard fluorescent dyes used in this study.

Monomer or mono-functional compound	Source	Vacuum-drying condition	Melting point (°C) ^a
1,2,3,4-Cyclobutanetetracarboxylic dianhydride (CBDA)	Nissan Chemical	160 °C/12 h	241
4,4'-Methylenebis(cyclohexylamine) (mixture of isomers) (MBCHA)	New Japan Chemical	---	40 ^b
2,2'-Bis(trifluoromethyl)benzidine (TFMB)	Wakayama Seika	50 °C/12 h	184
2,2-Bis[4-(4-aminophenoxy)phenyl] hexafluoropropane (HFBAPP)	Wakayama Seika	50 °C/12 h	163
4,4'-Oxydianiline (4,4'-ODA)	Wako Pure Chemical	50 °C/12 h	191
2,3-Anthracenedicarboxylic anhydride (23ACA)	Tokyo Chemical Industry	---	353
Quinine sulfate dihydrate (QS)	Wako Pure Chemical	---	---
<i>N,N'</i> -Bis(2,5-di- <i>tert</i> -butylphenyl)-3,4,9,10-perylenedicarboxydiimide (DBu-PEDI)	Sigma-Aldrich	---	---

^a T_m determined from the endothermic peak temperature measured at 5 °C/min on DSC.

^b T_m from the safety data sheets.

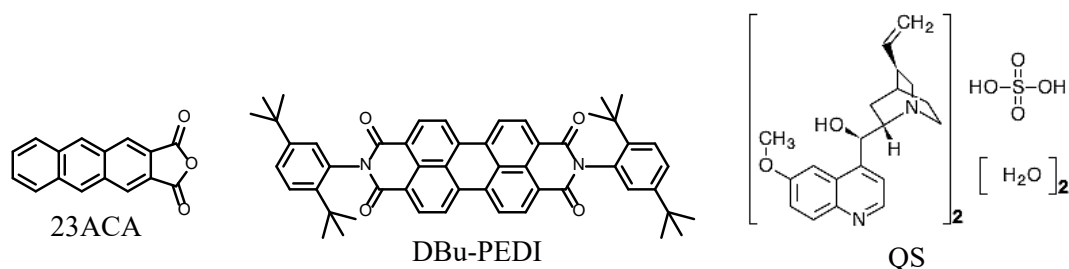
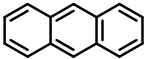
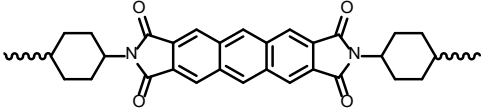
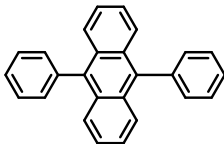
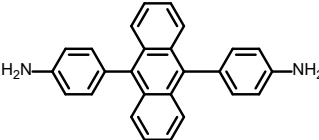
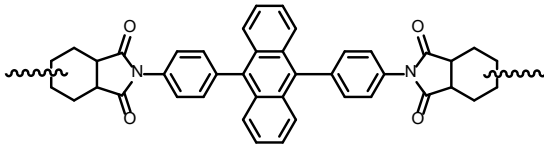
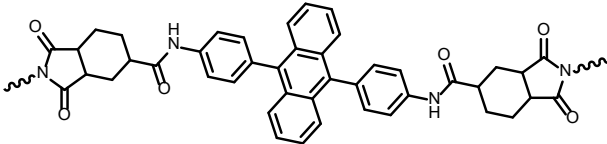


Table S3. The presence or absence of vibronic structures in the UV-visible absorption and fluorescence spectra and the mirror images between them for anthracene (*a*), its non-functional derivatives: 9,10-diphenylanthracene [DPA (*c*) and BAPA (*d*)] in solution, and those covalently incorporated into cycloaliphatic PI main chains [ACDA (*b*), BAPA (*e*), HTA-BAPA (*f*), and TPDA (*g*)] in the solid state.

	Fluorophore	Vibronic structure in UV-visible absorption spectra	Vibronic structure in fluorescence spectra	Mirror image relationship
<i>a</i>		Observed	Observed	Perfectly maintained
<i>b</i>		Observed	Observed	Almost maintained
<i>c</i>		Observed	Observed	Partially maintained
<i>d</i>		Observed	Disappeared	None
<i>e</i>		Observed	Almost Disappeared	None
<i>f</i>		Observed	Disappeared	None
<i>g</i>		None	None	Observed

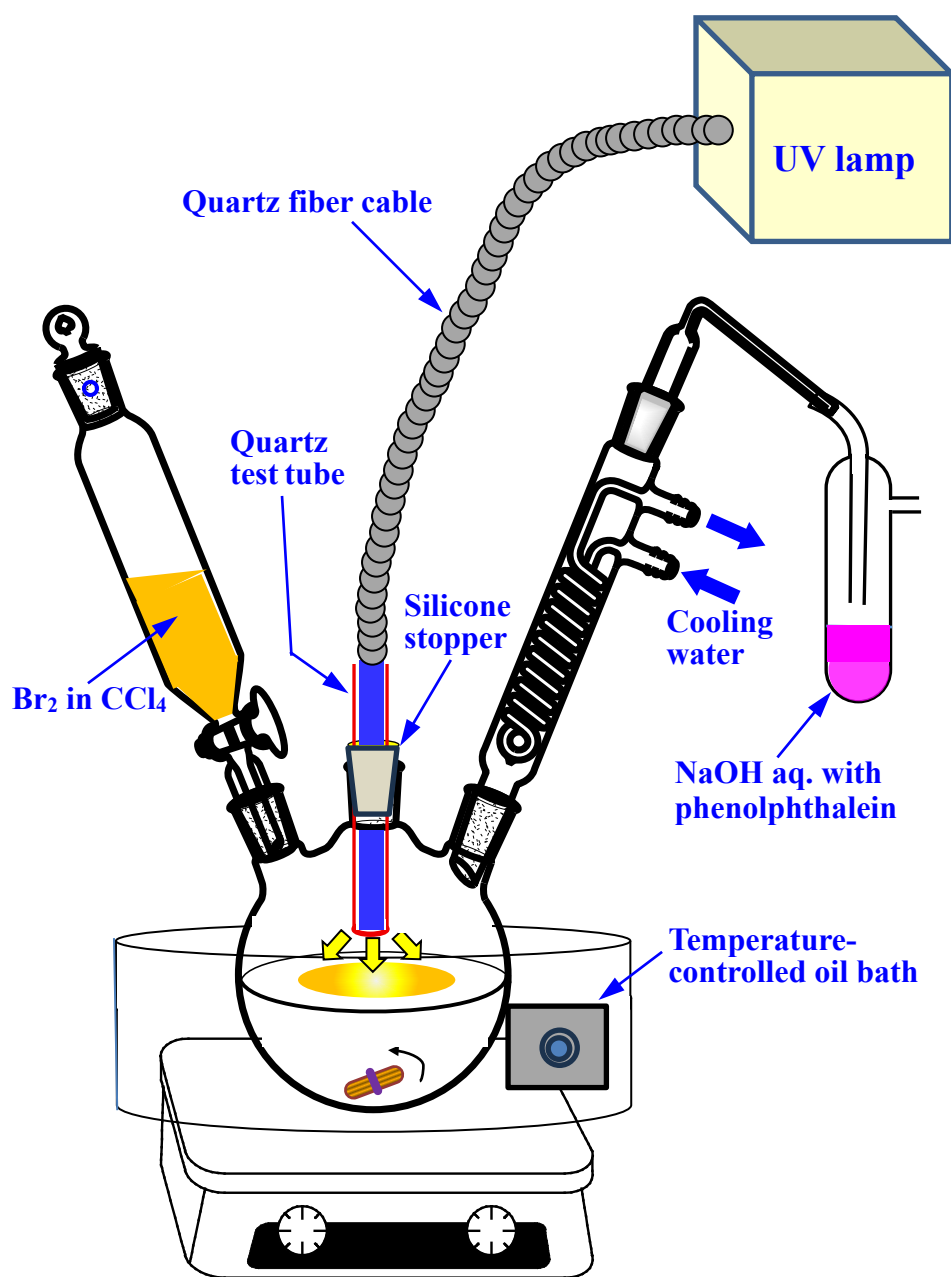


Figure S1. Schematic diagram of the setup used for bromination of durene.

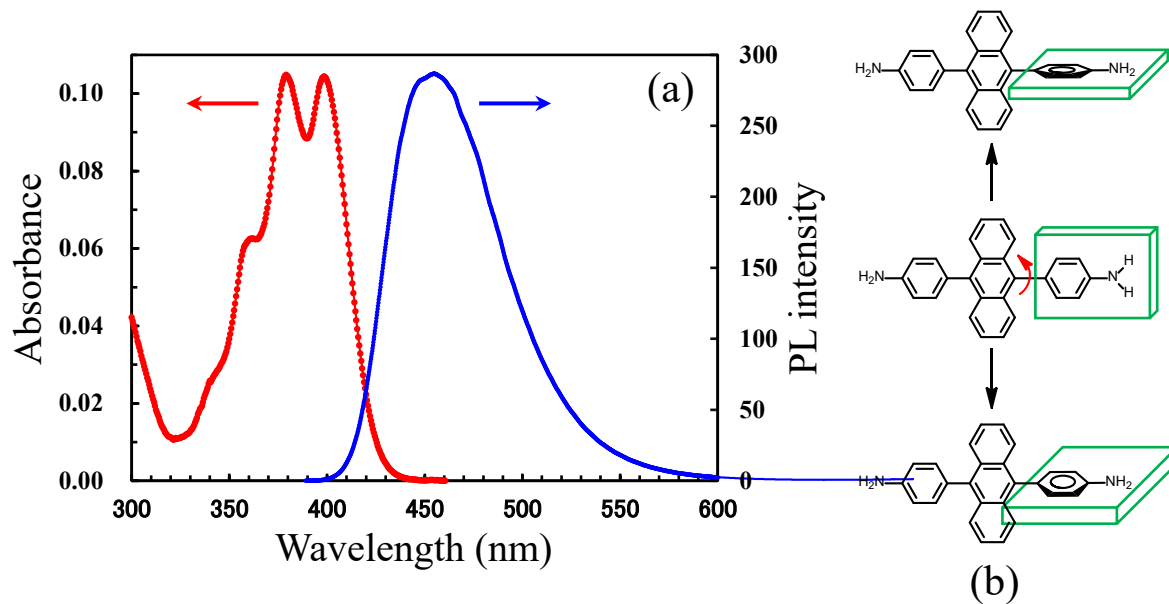


Figure S2. UV-visible absorption (red curve) and PL spectra (blue curve) of BAPA in chloroform (1.00×10^{-5} M) (a) and a schematic drawing of conformational change in the terminal dimethyl aniline units of BAPA during the singlet excited state (b).

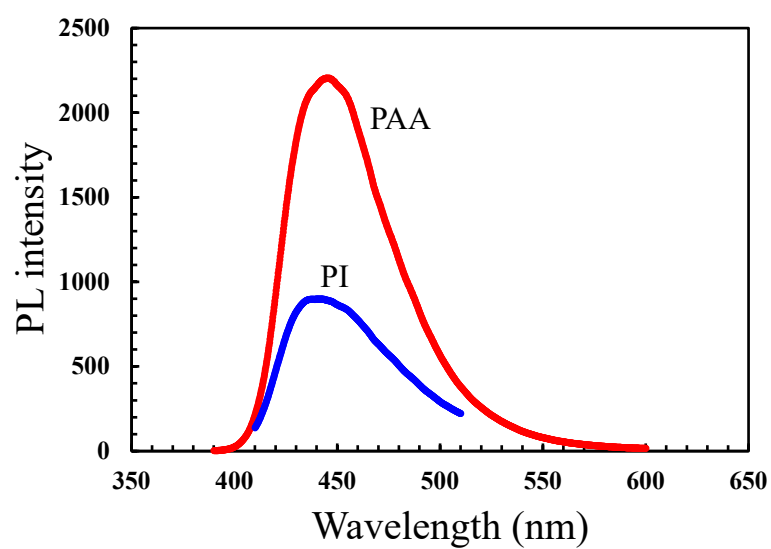


Figure S3. PL spectra of HTA-BAPA (2 mol%)-incorporated CBDA/MBCHA for the PAA and PI film.