Supporting Information

Selective Dispersion of Single-Walled Carbon Nanotubes via Easily Accessible Conjugated Click-Polymers

Peter Gerstel[1,5+], Stefanie Klumpp[2+], Frank Hennrich[2], Ozcan Altintas[1], Thomas R. Eaton[3], Marcel Mayor[3,5], Christopher Barner-Kowollik[1,5] and Manfred M. Kappes[2,4,5]**

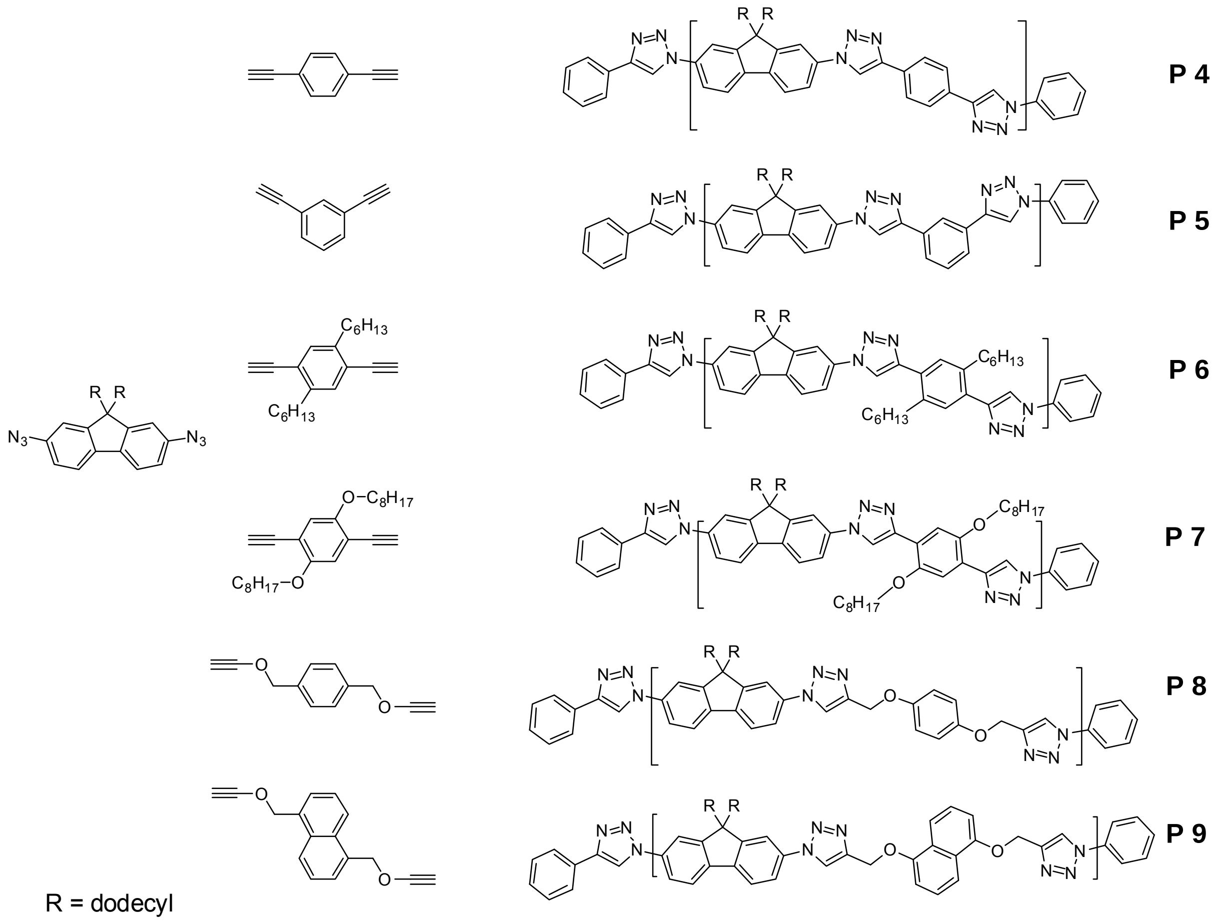
[1]Preparative Macromolecular Chemistry, Institut für Technische Chemie und Polymer Chemie, Karlsruher Institute of Technology (KIT), 76128 Karlsruhe, Germany,
[2]Institut für Nanotechnologie (INT), Karlsruher Institut für Technologie (KIT), 76021 Karlsruhe, Germany,
[3]Department of Chemistry, University of Basel, 4056 Basel, Switzerland
[4]Institut für Physikalische Chemie, Karlsruher Institut für Technologie (KIT), 76128 Karlsruhe, Germany
[5]Center for Functional Nanostructures, Karlsruher Institut für Technologie (KIT), 76128 Karlsruhe, Germany

[+]These authors have contributed equally to the present study

Corresponding Authors: christopher.barner-kowollik@kit.edu,

manfred.kappes@kit.edu

Synthesis of Building Blocks and Polymers



Scheme 1 Building-blocks and the associated polymers **P4-P9**

Materials and Methods

The manipulation of all air/water sensitive compounds was carried out using standard high vacuum techniques. Commercially purchased reagent grade solvents were degassed with argon prior to use. Chemicals were obtained from commercial sources or following literature procedures. Analytical thin layer chromatography was carried out on *Merk® silicagel 60 F*$_{254}$ glass TLC plates and visualized with UV light.

NMR spectra were recorded at ambient probe temperature using a *Bruker DPX-NMR* (400 MHz and 250 MHz) spectrometer. Chemical shifts (δ) are quoted in parts per million (ppm) relative to the residual solvent peak ($CDCl_3$: 7.26 ppm) or to TMS-standard. Multiplicities are denoted; singlet (s), doublet (d), triplet (t), multiple (m) and doublet of doublets (dd). Carbon valency was determined with a DEPT measurement and are denoted; quaternary (Cq), tertiary (Ct), secondary (Cs) and primary (Cp).

Mass spectra were obtained by GC-MS, ESI-MS and EI (70eV). Molecular ions are denoted and only the major peak reported.

Elemental analyses were measured on a *Perkin-Elmer Analysator 240* and the values are given in percent. Melting points (mp) were determined with a *Stuart SMP3* apparatus and are uncorrected.

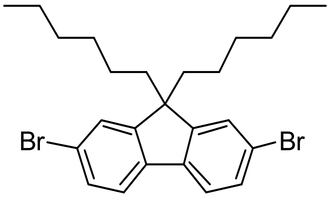
Size Exclusion Chromatography (SEC) measurements were performed on a Polymer Laboratories PL-GPC 50 Plus Integrated System, comprising an autosampler, a PLgel 5 µm bead-size guard column (50 × 7.5 mm) followed by the three PLgel 5 µm MixedC columns (300 × 7.5 mm) and a differential refractive index detector using THF as the eluent at 35 °C with a flow rate of 1 mL min^{-1}. The SEC system was calibrated using linear polystyrene standards.

Synthesis of the Building Blocks

Diazido Compounds

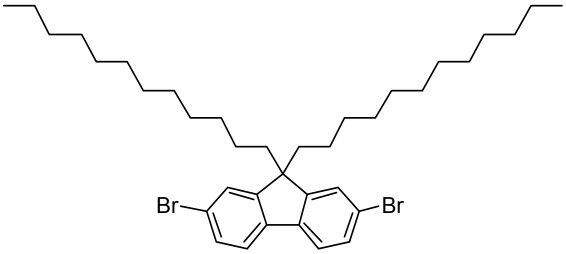
The alkylation of the 2,7-Dibromofluoren followed literature procedure.[1] p-Toluenesulfonyl azides were prepared after a literature procedure.[2]

2,7-Dibromo-9,9-dihexyl fluorene



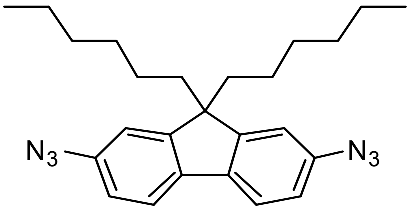
In a three neck flask 5.0 g 2,7-dibromo fluorene (15.5 mmol) was mixed with 50 g NaOH (50%) and 555 mg tetrabutylammonium iodide (1.5 mmol). The reaction mixture was freed from oxygen by three consecutive freeze, pump and thaw cycles. In a second flask 20.6 g (17.5 ml) (124.7 mmol) 1-bromo hexane was deoxygenized by three freeze, pump and thaw cycles and added to the 2,7-dibromo fluorene under argon. The reaction mixture was heated to 70°C under vigorous stirring and kept three hours at this temperature. The color changed from purple to blue. The mixture was allowed to cool to ambient temperature and 50 mL chloroform was added. The aqueous phase was separated. The organic phase was washed three times with water and dried with Na_2SO_4. The raw product was purified by column chromatography over silica with a mixture of n-hexane/chloroform 9/1 as eluent. 6.2 g (81.5%) of a white solid were received. ^{1}H NMR ($CDCl_3$, 250 MHz) δ ppm 7.52 (dd, 2H), 7.46 (d, 2H), 7.44 (d, 2H), 1.91 (m, 4H), 1.05-1.18 (m, 12 H), 0.78 (t, 6H), 0.49-0.66 (m, 4H).

2,7-Dibromo-9,9-didodecyl fluorene



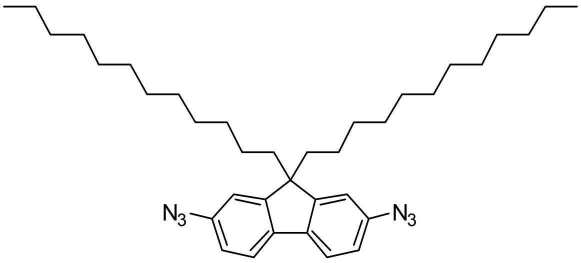
In a 250 mL three neck flask 5.0 g 2,7-dibromo fluorene (15.5 mmol) was mixed with 50 g NaOH (50%) and 555 mg tetrabutylammonium iodide (1.5 mmol). The reaction mixture was freed from oxygen by three consecutive freeze, pump and thaw cycles. In a second flask 46.7 g (45.0 mL) (177.4 mmol) 1-bromohexane was deoxygenized by three freeze, pump and thaw cycles and added to the 2,7-dibromo fluorene under argon. The reaction mixture was heated to 70°C under vigorous stirring and kept for 8 h at this temperature. The color changed to green. The mixture was allowed to cool to ambient temperature and 200 mL chloroform was added. The aqueous phase was separated. The organic phase was washed three times with water and dried with Na_2SO_4. The raw product was purified by column chromatography over silica with a mixture of n-hexane/chloroform 9/1 as eluent. 8,4 g (82.3%) of a white solid was received. ^1H NMR ($CDCl_3$, 250 MHz) δ ppm 7.52 (dd, 2H), 7.46 (d, 2H), 7.44 (d, 2H), 1.90 (m, 4H), 0.99-1.36 (m, 36H), 0.87 (t, 6H), 0.58 (m, 4H).

2,7-Diazido-9,9-dihexyl fluorene[3]



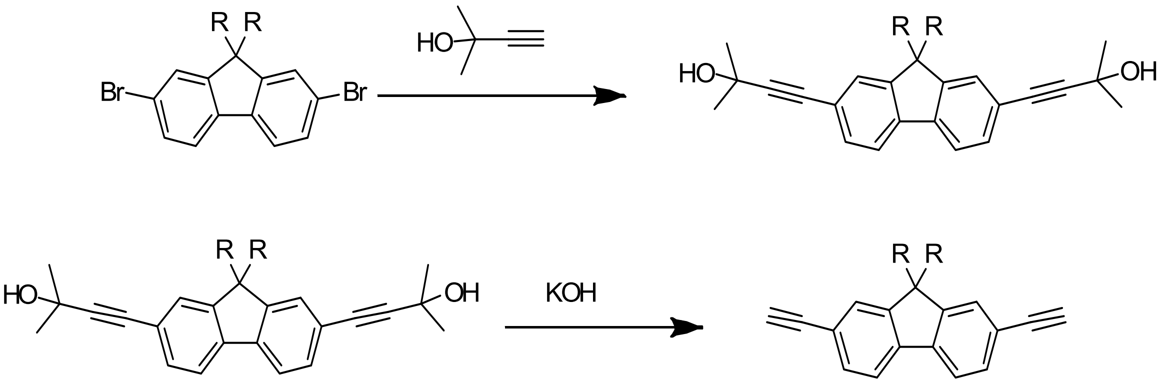
In a flame dried three necked flask 40 mL dry THF was cooled to -78°C. 17.6 mL *tert*.- butyllithium (1.6 mol in pentane) (28 mmol) was added within 5 min. After 15 min stirring a solution of 3.0 g (6.1 mmol) 2,7-dibromo 9,9-dihexylfluoren dissolved in 8 mL dry THF was added drop wise, followed by stirring for 15 min at -78 °C. The color of the solution changed to yellow-green. 5.6 g (28.4 mmol) p-tosylazide dissolved in 3 mL THF was added within 30 min. The color changed to red or red-brown. The reaction mixture was kept for 8 h at -78°C. 5 mL saturated aqueous ammonium chloride was added and the solution was allowed to warm up to ambient temperature over night. The solvent was removed by rotary evaporation, extracted with 200 mL diethyl ether and washed with brine. The organic phase was dried with Na_2SO_4 and the solvent was removed by rotary evaporation. The raw product was purified by column chromatography over silica with petrolether as eluent. 1.5 g (62.5%) of a light yellow solid was received. ^1H NMR ($CDCl_3$, 250 MHz) δ ppm 7.6(d, 2H), 6.99 (dd, 2H), 6.94 (d, 2H), 1.93-1.89 (m, 4H), 1.12-1.04 (m, 12H), 0.77 (t, 6H), 0.57 (s, 4H). ^{13}C NMR ($CDCl_3$, 101 MHz) δ ppm 152.59, 138.74, 137.61, 120.55, 117.88, 113.59, 55.45, 40.41, 31.48, 29.58, 23.64, 22.56, 13.98. ESI-MS m/z: 439 (M Na^+).

2,7-Diazido-9,9-didodecyl fluorene[3]



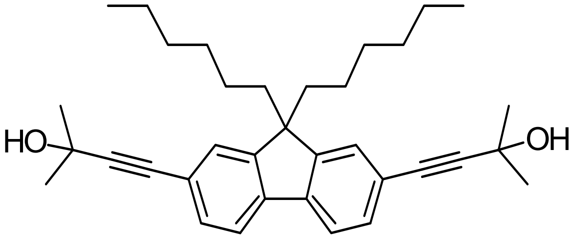
In a flame dried three necked flask 40 mL dry THF was cooled to -78°C. 17.6 mL *tert*.-butyllithium (1.6 mol in pentane) (28 mmol) was added within 5 min. After 15 min stirring a solution of 4.0 g 2.7-dibromo 9,9-didodecylfluoren (6.1 mmol) dissolved in 8 mL dry THF was added drop wise, followed by stirring for 15 min at -78 °C. The color of the solution changed to yellow-green. 5.6 g tosylazide (28.4 mmol) dissolved in 6 mL THF was added within 30 min. The color changed to red brown. The reaction mixture was kept for 8 h at -78°C. 5 mL saturated aqueous ammonium chloride was added and the solution was allowed to warm to ambient temperature over night. The solvent was removed by rotary evaporation, extracted with 200 mL diethyl ether and washed with brine. The organic phase was dried with Na_2SO_4, the solvent was removed by rotary evaporation. Purification by column chromatography over silica with petrolether as eluent was followed. 2.6 g (73.2%) of a light yellow solid were obtained. ^{1}H NMR ($CDCl_3$, 250 MHz) δ ppm 7.6(d, 2H), 6.99 (dd, 2H), 6.94 (d, 2H), 1.93-1.89 (m, 4H), 1.30-1.00 (m, 36H), 0.82 (t, 6H), 0.57 (s, 4H). ^{13}C NMR ($CDCl_3$, 101 MHz) δ ppm 152.88, 138.74, 120.8, 117.87, 113.60, 40.38, 29.97, 29.71, 29.56, 23.67, 22. 69, 14.11. ESI-MS m/z: 607 (M Na^+).

Diethynyl Compounds



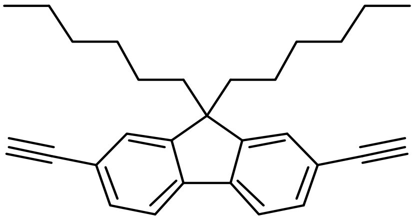
Scheme 2. Preparation of the dialkynyl fluorene[3]

2,7-Bis(3-hydroxy-3-methylbutynyl)-9,9-dihexyl fluorene



In a 100mL three-neck flask were subsequently added 12 mL diethylamine, 6 mL THF, 3.0 g 2,7-dibromo-9,9-dihexyl fluorene (6.1 mmol) and 1.8 g 2-methyl-but-3-yn-2-ol (20.7 mmol). The solution was degassed by three consecutive freeze, pump thaw cycles. 50 mg bis(triphenylphosphine)palladium(II)dichloride (0.07 mmol) and 4 mg copper(I)iodide (0.02 mmol) were added under argon. The reaction mixture was stirred at ambient temperature for 36 h. The suspension was filtered and the solvent was removed by distillation in vacuum. The brown residue was purified by column chromatography over silica with 1/1 *n*-hexane/ethylacetate as eluent. 1.7 g (55.7 %) of a slight yellow solid was afforded. ^{1}H NMR ($CDCl_3$, 250 MHz) δ ppm 7.6 (d, 2H), 7.40 (d, 4H), 2.05 (s, 2H), 1.93 (m, 4H), 1.66 (s, 12H), 0.96-1.21 (m, 12H), 0.77 (t, 6H), 0.44-0.63 (m, 4H).

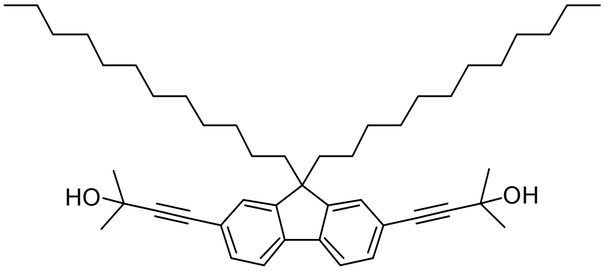
2,7-Diethynyl-9,9-dihexyl fluorene



1.7g 2,7-bis(3-methyl but-1-yn-3-ol)-9,9-dihexyl fluorene (3.4 mmol) was dissolved in 222 mL toluene. 1.85 g KOH (30.4 mmol) was added. The suspension was stirred at

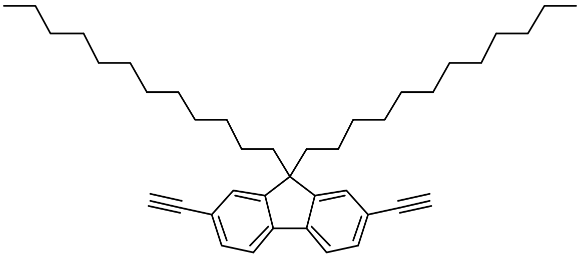
100°C for 10 h. After cooling to ambient temperature the suspension was filtered and the solvent removed by rotary evaporation. The brown residue was purified by column chromatography over silica with *n*-hexane as solvent. 750 mg (57.7 %) of a white solid was received. ^{1}H NMR ($CDCl_3$, 250 MHz) δ ppm 7.63 (d, 2H), 7.48 (d, 4H), 3.15 (s, 2H), 1.93 (m, 4H), 0.98-1.15 (m, 12H), 0.76 (t, 6H), 0.44-0.63 (s, 4H). ^{13}C NMR ($CDCl_3$, 101 MHz) δ ppm 151.06, 140.99, 131.25, 126.55, 120.85, 119.97, 84. 53, 55.21, 40.25, 31.49, 29.71, 23.82, 22.74, 14,13. ESI-MS m/z: 382 (M^+)

2,7-Bis(3-hydroxy-3-methyl but-1-ynyl)-9,9-didodecyl fluorene



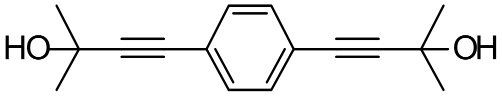
In a three-necked flask were subsequently added 17 mL diethylamine, 10 mL THF, 5.8 g 2,7-dibromo-9,9-dihexyl-fluorene (8.78 mmol) and 2.7 g 2-methyl-but-3-yn-2-ol (31.1 mmol). The solution was degassed by three consecutive freeze, pump, thaw cycles and left under argon followed by the addition of 6 mg copper(I)iodide (0.032 mmol) and 85 mg, bis(triphenylphosphine)palladium(II)dichloride (0.12 mmol). The reaction mixture was stirred for 20 h under argon atmosphere at 55°C and the solvent was subsequently removed under reduced pressure. The crude product was purified by column chromatography with *n*-hexane/ethylacetate (1/1). A light yellow solid was afforded 4.78 g, (82%). ^{1}H NMR ($CDCl_3$, 250 MHz) δ ppm 7.59 (d, 2H), 7.39 (d, 4H), 2.10(s, 2H), 1.93 (m, 4H), 1.66 (s, 12H), 0.96-1.36 (m, 36H), 0.86 (t, 6H), 0.44-0.63 (m, 4H).

2,7-Diethynyl-9,9-didodecyl fluorene



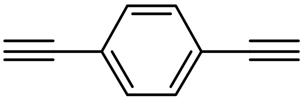
3 g 2,7-bis(3-hydroxy-3-methyl but-1-ynyl)-9,9-didodecyl (4.5 mmol) fluorene was dissolved in 300 mL freshly distilled toluene in a round bottom flask and 2.5 g KOH (44,6 mmol) was added. The resulting suspension was stirred for 20 h at 100 ºC. After cooling to ambient temperature the suspension was filtered over silica gel. The solvent was removed by rotary evaporation under reduced pressure and the residue was subjected to column chromatography with *n*-hexane to give 2,0 g, (82 %) as a yellow oil. ^{1}H NMR (250 MHz, $CDCl_3$) δ (ppm) ^{1}H NMR ($CDCl_3$, 250 MHz) δ ppm 7.63 (d, 2H), 7.48 (d, 4H), 3.15 (s, 2H),1.93 (m, 4H), 0.94-1.35 (s, 36H), 0.86 (t, 6H), 0.44-0.64 (m, 4H). ^{13}C NMR ($CDCl_3$, 101 MHz) δ ppm 151.26, 140.98, 131.54, 126.54, 120.88, 119.95, 84.52, 55.41, 40.04, 31.91, 29.60, 23.68, 22.51, 14.28. ESI-MS m/z: 550 (M^+).

1,4-Bis(3-hydroxy-3-methylbut-1-ynyl) benzene



In a 100 mL three neck flask 4.72 g 1,4 dibromo benzene (20 mmol), 6 mL 2-methylbut-3-yn-2-ol 4 (63.9 mmol) and 25 mL diethylamine were added. The oxygen was removed by three consecutive freeze, pump and thaw cycles. Under argon 56.1 mg bis(triphenylphosphine)palladium(II)dichloride (0.08mmol) and 16.1 mg copper (I) iodide (0.08 mmol) were added and the reaction mixture was heated to 55 °C and kept 24 h under vigorous stirring at this temperature. After cooling to ambient temperature the mixture was filtered and the solvent removed by rotary evaporation. The brown solid was purified by recrystallisation in toluene. 3,68 g (76%) of white crystals were received. ^{1}H NMR ($CDCl_3$, 250 MHz) δ ppm 7.35 (s, 4H), 1.62 (s, 12H).

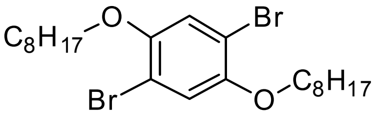
1,4-Diethynyl benzene



In 36 mL dry 2-propanol; 230 mg sodium (10 mmol) was dissolved at 40°C. After complete dissolving of the sodium, 3.69 g 1,4-bis(3-hydroxy-3-methylbutynyl) benzene (15.2 mmol) was added. A slight stream of argon was applied and the reaction mixture kept 4.5 h at 84°C. The solution was cooled to ambient temperature. 80 mL diethyl ether were added and the mixture was washed three times with water. The solvent was removed by rotary evaporation and the brown residue purified by sublimation. 1.18 g (61.5%) of a white, crystalline product was recieved.^{1}H NMR

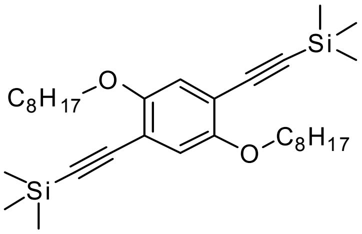
($CDCl_3$, 250 MHz) δ ppm 7.45 (s, 4H), 3.18 (s, 2H). ^{13}C NMR ($CDCl_3$, 101 MHz) δ ppm 132.00, 122.69, 83.12, 79.03.

1,4-Dibromo-2,5-bis (oxyloxy) benzene



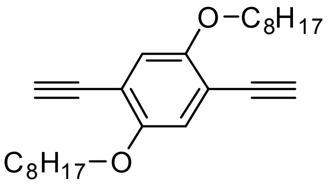
3.1 g 1,4-dibromo-2,5-hydrochinone (11.6 mmol), 3.6 g potassium carbonate (26 mmol), 4.5 g 1-bromooctane (25.9 mmol) were mixed with 40 mL of dry DMF. The mixture was stirred at 80 °C for 24 h. The product was precipitated in 300 mL water, filtrated, washed thoroughly with water and dried in vacuum. 5.4 g (94.1%) of a white solid was received. ^1H NMR ($CDCl_3$, 250 MHz) δ ppm 7.09 (s, 2H), 3.95 (t, 4H), 1.80 (m, 4H), 1.21-1.54 (m, 20H), 0.89 (t, 6H).

1,4-Bis (trimethylsilylethynyl)-2,5-bis (oxyloxy) benzene



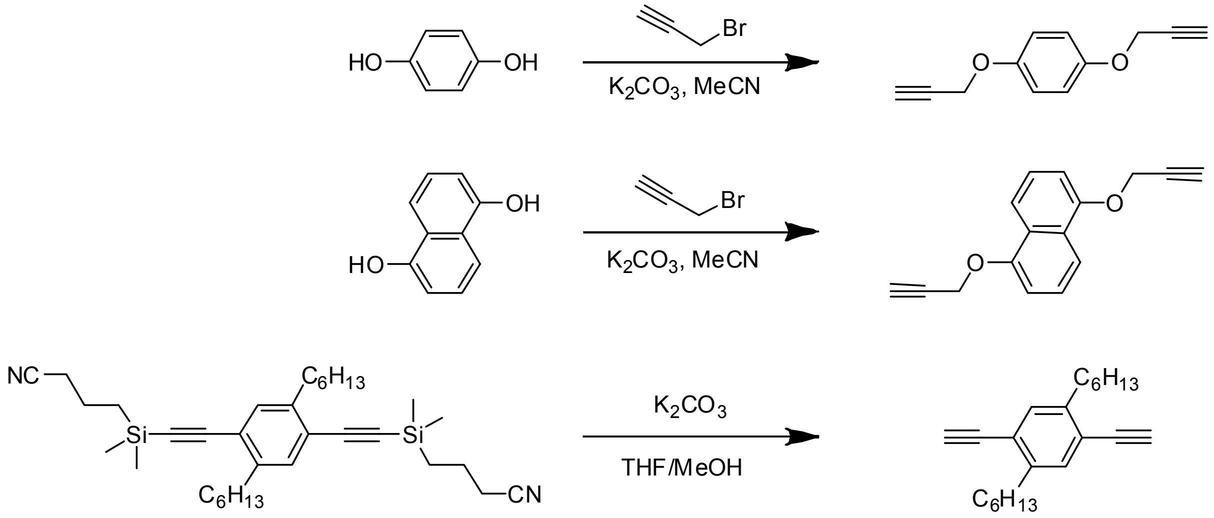
5.3 g 1,4-dibromo-2,5-bis (oxyloxy) benzene (10.9 mmol), 2.57 g trimethylsilyl acetylene (26.2 mmol) and 14 mL diethylamin were dissolved in 8 mL dry THF. Oxygen was removed by three consecutive freeze, pump and thaw cycles. Under argon 30.9 mg bis(triphenylphosphine)palladium(II)dichloride (0.04 mmol) and 8.9 mg copper (I)iodide (0.05 mmol) were added. The reaction mixture was heated to 55°C and kept under stirring 20 h. The solution was filtered and the solvent removed under reduced pressure. The product was purified by column chromatography over silica with 15/1 petrol ether/ethylacetate as eluent.3.9 g (68.4%) of a white solid was received. ^{1}H NMR ($CDCl_3$, 250 MHz) δ ppm 6.89 (s, 2H), 3.94 (t, 4H), 1.78 (m, 4H), 1.20-1.56 (m, 20H), 0.89 (t, 6H), 0.25 (s, 12H).

1,4-Diethynyl 2,5-bis (octyloxy) benzene[4]



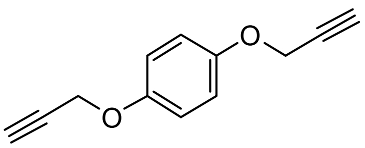
1.0 g 1,4-bis (trimethylsilylethynyl)-2,5-bis (oxyloxy) benzene (1.9 mmol) was dissolved in 60 mL THF, 30 mL methanol and 60 mL 20% NaOH were added. The solution was stirred at ambient temperature for 2 h. The product was extracted with 90 mL diethyl ether, washed 3 times with water and dried over Na_2SO_4. The solvent was removed by rotary evaporation. The product was purified by column chromatography over silica with 15/1 petrolether/ethylacetate as eluent. 0.51 g (69.9%) of a white solid was received. ^{1}H NMR ($CDCl_3$, 250 MHz) δ ppm 6.95 (s, 2H), 3.97 (t, 4H), 3.34 (s, 2H), 1.80 (m, 4H), 1.18-1.53 (m, 20H), 0.89 (t, 6H) ^{13}C NMR ($CDCl_3$, 101 MHz) δ ppm 153.99, 117.76, 113. 27, 82.39, 79.79, 69.68, 31.81, 29.30, 25.91, 22.67, 14.11. ESI-MS m/z: 405 (M^+)

Additional monomer synthesis



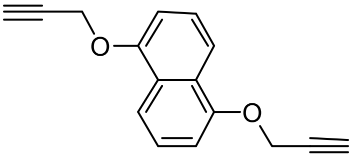
The monomers 1,4-bis(Prop-2-yn-1-yloxy)benzene and 1,5-bis(Prop-2-yn-1-yloxy)naphthalene were synthesized by reacting hydroquinone and 1,5-dihydroxynapthalene respectively with propargyl bromide under basic conditions of K_2CO_3 in MeCN. 1,4-Diethynyl-2,5-dihexylbenzene was synthesized in four steps starting from 1,4-dichlorobenzene following a literature procedure.[5,6,7,8]

1,4-Bis(prop-2-yn-1-yloxy) benzene



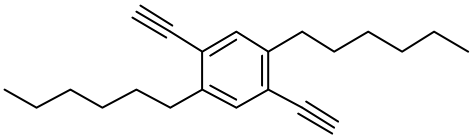
1.00 g, Hydroquinone (9.08 mmol) and 3.17 g K_2CO_3 (22.7 mmol) were dissolved in 20 mL MeCN, then while stirring at ambient temperature 2.95 mL propargyl bromide solution (80% wt in toluene) (27.2 mmol) was added drop wise. After 14 h 50 mL H_2O was added and the aqueous layer was washed twice with 50 mL TBME. The organic layer was neutralized with 2M aqueous HCl, washed with brine and dried over $MgSO_4$. The solvent was removed and the crude product passed through a column of SiO_2 (1/1 cyclohexane/DCM). The fractions were combined and the solvent removed under reduced pressure to afford 1,4-bis(prop-2-yn-1-yloxy)benzene as a white solid (1.13 g, 67%). mp: 49.1°C. R_f = 0.33 (1/1 cyclohexane/DCM). ^{1}H NMR (400 MHz, $CDCl_3$): δ_H 6.93 (s, 4H, Ar H), 4.65 (d, J = 2.4 Hz, 4H, $–OCH_2C{\equiv}C$), 2.51 (t, J = 2.4 Hz, 2H, acetylene H). ^{13}C NMR (101 MHz, $CDCl_3$): δ_C 152.6 (Cq), 116.2 (Ct), 78.9 (Ct), 75.5 (Ct), 56.7 (Cs). GC–MS *m/z*: 186 (M^+). Anal. Calcd for $C_{12}H_{10}O_2$: C, 77.40; H, 5.41. Found: C, 77.25; H, 5.51.

1,5-Bis(prop-2-yn-1-yloxy) naphthalene



1.00 g 1,5-Dihydroxynaphthalene (6.24 mmol) and 2.18 g K_2CO_3 (15.6 mmol) were dissolved in 10 mL MeCN, then while stirring at ambient temperature 2.02 mL propargyl bromide solution (80% wt in toluene) (18.7 mmol) was added drop wise. After 14 h 50mL H_2O was added and the aqueous layer was washed twice with 50 mL TBME. The organic layer was neutralized with 2M aqueous HCl, washed with brine and dried over $MgSO_4$. The solvent was removed and the crude product passed through a column of SiO_2 (1/1 cyclohexane/DCM), the fractions were combined and the solvent removed under reduced pressure to afford 0.31 g (21%) of 1,5-bis(prop-2-yn-1-yloxy)naphthalene as a white solid. mp 146.3°C. R_f = 0.42 (1/1 cyclohexane/DCM). ^{1}H NMR (400 MHz, $CDCl_3$): δ_H 7.91 (d, J = 8.6 Hz, 2H), 7.39 (dd, J = 8.3, 7.7 Hz, 2H), 6.98 (d, J = 7.7 Hz, 2H), 4.89 (d, J = 2.4 Hz, 4H, $–OCH_2C{\equiv}C$), 2.55 (t, J = 2.4 Hz, 2H, acetylene H). ^{13}C NMR (101 MHz, $CDCl_3$): δ_C 153.3 (Cq), 126.9 (Cq), 125.3 (Ct), 115.4 (Ct), 106.5 (Ct), 78.7 (Ct), 75.7 (Ct), 56.3 (Cs). GC-MS *m/z*: 236 (M^+). Anal. Calcd for $C_{16}H_{12}O_2$: C, 81.34; H, 5.12. Found: C, 81.08; H, 5.17.

1,4-Diethynyl-2,5-dihexylbenzene

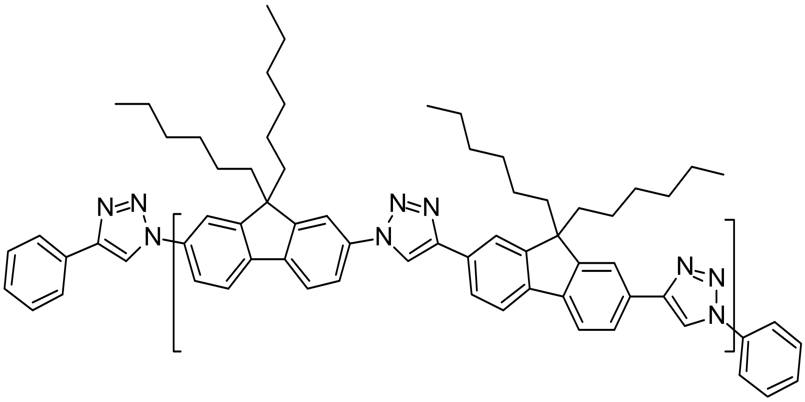


500 mg 1,4-bis[2-[(3-Cyanopropyl)dimethylsilyl]ethynyl]-2,5-dihexylbenzene[5,6] (0.92 mmol) were dissolved in 16 mL of an argon degassed 1:1 mixture of THF:MeOH. Subsequently 512 mg of finely ground K_2CO_3 (3.67 mmol) was added. After 30 min the reaction was deemed complete by TLC (1:1 cyclohexane:DCM) and was quenched with H_2O, extracted with TBME, neutralized with 2M aqueous HCl and dried over $MgSO_4$. The solvent was removed and the crude passed through a column of SiO_2 (cyclohexane) fractions combined and solvent removed under reduced pressure to afford 122 mg (45%). of 1,4-diethynyl-2,5-dihexylbenzene as a yellow oil. R_f = 0.43 (cyclohexane). ^{1}H NMR (400 MHz, $CDCl_3$): δ_H 7.29 (s, 2H, Ar H), 3.28 (s, 2H, acetylene H), 2.74 – 2.68 (m, 4H), 1.65 – 1.56 (m, 4H), 1.39 – 1.25 (m, 12H), 0.89 (t, *J* = 6.9 Hz, 6H). ^{13}C NMR (101 MHz, $CDCl_3$): δ_C 142.9 (Cq), 133.1 (Ct), 122.1 (Cq), 82.4 (Ct), 81.7 (Ct), 33.9 (Cs), 31.8 (Cs), 30.6 (Cs), 29.2 (Cs), 22.7 (Cs), 14.2 (Cp). EIMS (70eV) *m/z*: M^+ 294.2. Analytical data are in good agreement with literature.[5]

Synthesis of the Click Polymers

P1

Poly[(9,9 dihexyl-2,7-fluorene)-1,4-(1,2,3-triazol)]

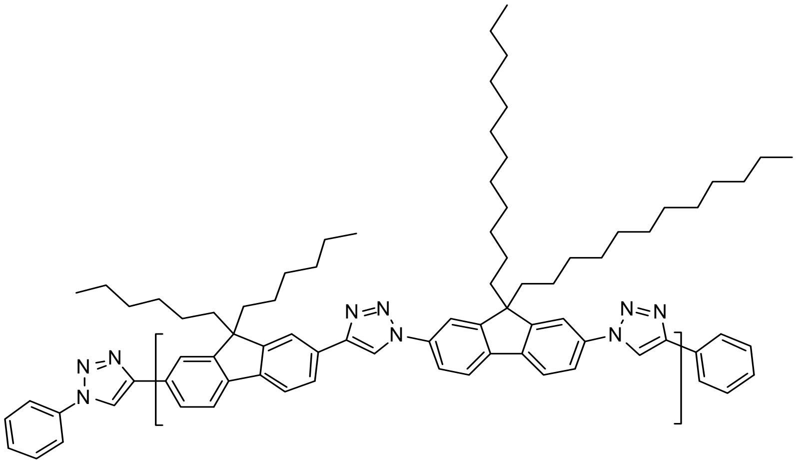


In a 20 ml Schlenk-tube, 50 mg 2,7-diazido-9,9-dihexyl fluorene (0.13 mmol) and 54.5 mg 2,7-diethynyl-9,9-dihexyl fluorene (0.13 mmol) were dissolved in 5 mL THF. 0.5 mL (375 mg) triethylamine (3.7 mmol) and 5.2 mg sodium ascorbate (0.026 mmol) were added. To remove the oxygen three consecutive freeze, pump, thaw cycles were performed. Subsequently 3.2 mg $CuSO_4$ $5H_2O$ (0.013 mmol) was added under argon, followed by an additional set of three freeze, pump and thaw cycles. The reaction mixture was vigorously stirred at 35°C for 24 h. To stop the polymerization and for the end-capping of the chain termini 0.03 mL azidobenzene was added under argon. After 15 minutes, 0.03 mL ethynylbenzene was added. After 15 min the solution was dissolved in 30 mL Chloroform, washed three times with EDTA solution (5% in water) and three times with water. The organic phase was separated and dried with Na_2SO_4. The solvent was removed by rotary evaporation. The polymer was dried in vacuum. A yellow solid was obtained.

^{1}H NMR ($CDCl_3$, 400 MHz) δ ppm 8.37-8.29 (m), 8.21 (s), 8.04-7.96 (m), 7.96-7.87 (m), 7.87-7.66 (m), 7.60-7.51 (m), 7.51-7.42 (m), 7.43-7.32 (m), 7.08-6.97 (m), 3.16 (s); 2.3-1.9(m), 1.46-1.36(m), 1.28-1.20 (m), 1.20-0.97 (m), 0.81-0.58 (m). ^{13}C NMR ($CDCl_3$, 101 MHz) δ ppm 153.03, 151.90, 149.05, 140.38, 136.70, 129.81, 128.84, 121.15, 120.56, 120.27, 119.66, 117.77, 115.38, 56.29, 40.63, 40.39, 31.55, 30.32, 29.79, 23.87, 22.58, 13.99. Molecular weight characteristics: M_n = 5 500 gmol^{-1}; M_w = 10 600 gmol^{-1}, *PDI* = 1.9

P2

Poly[(9,9 dihexyl-2,7-fluorene)-1,4-(1,2,3 triazol) alt (9,9 didodecyl-2,7-fluorene)-1,4-(1,2,3-triazole)]

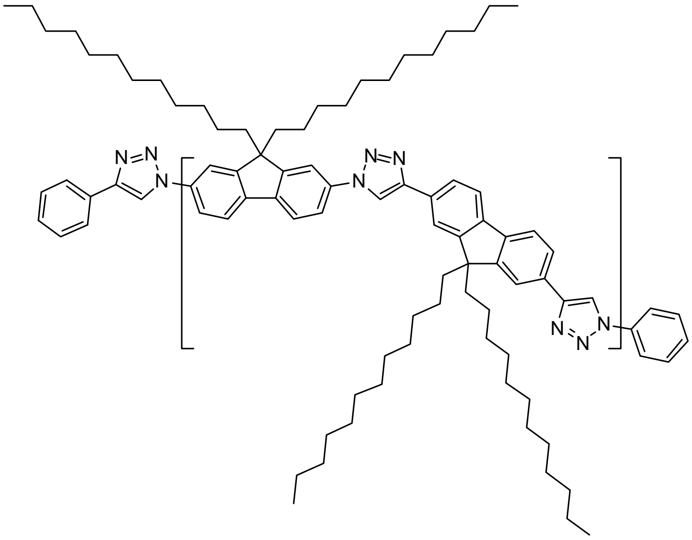


In a 20 ml Schlenk-tube, 152.9 mg 2,7-diazido-9,9-didodecylfluorene (0.26 mmol) and 100.0 mg 2,7-diethynyl-9,9-dihexyl fluorene (0.26mmol) were dissolved in 10 mL THF. 1.0 mL (730 mg) triethylamine (7.21 mmol) and 10.4 mg sodium ascorbate (0.052 mmol) were added. To remove the oxygen three consecutive freeze, pump and thaw cycles were performed. Subsequently 6.4 mg $CuSO_4$ $5H_2O$ (0.026 mmol) was added under argon, followed by an additional set of three freeze, pump and thaw cycles. The reaction mixture was vigorously stirred at 35°C for 24 h. To stop the polymerization and for the end-capping of the chain termini 0.05 mL azidobenzene was added under argon. After 15 minutes, 0.05 mL ethynylbenzene was added. After 15 min the solution was dissolved in 30 ml Chloroform, washed three times with EDTA solution (5% in water) and three times with water. The organic phase was separated and dried with Na_2SO_4. The solvent was removed by rotary evaporation. The polymer was dried in vacuum. A yellow solid was obtained.

^{1}H NMR ($CDCl_3$, 400 MHz) δ ppm 8.37-8.29(m), 8.21 (s), 8.04-7.96 (m), 7.96-7.87 (m), 7.87-7.66 (m), 7.60-7.51 (m), 7.51-7.42 (m), 7.43-7.32 (m), 7.01-6.97 (m), 2.31-2.03 (m), 1.46-2.03 (m), 1.45-1.39 (m), 1.28-1.07 (m), 0.87-0.74 (m). ^{13}C NMR ($CDCl_3$, 101 MHz) δ ppm 151.90, 137.11, 129.80, 128.79, 125.87, 120.56, 120.25, 117.58, 56.30, 40.63, 31.85, 31.60, 30.32, 29.98, 29.70, 29.56, 29.29, 22.62, 14.05. Molecular weight characteristics: M_n = 15 300 gmol^{-1}; M_w = 34 400 gmol^{-1}, *PDI* = 2.2.

P3

Poly[(9,9-didodecyl-2,7-fluorene)-1,4-(1,2,3-triazole)]

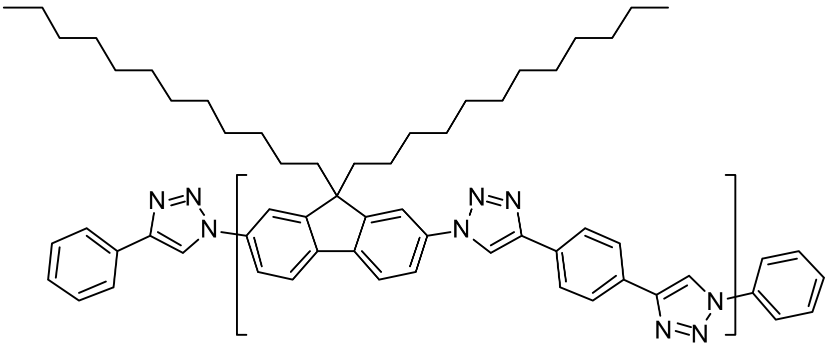


In a 20 ml Schlenk-tube, 152.9 mg 2,7-diazido-9,9-didodecyl fluorene (0.26 mmol) and 143 mg 2,7-diethynyl-9,9-didodecyl fluorene (0.26 mmol) were dissolved in 10 mL THF. 1 mL (730 mg) triethylamine (7.21 mmol) and 10.9 mg sodium ascorbate (0.055 mmol) were added. To remove the oxygen three consecutive freeze, pump and thaw cycles were performed. Subsequently 6.4 mg $CuSO_4$ $5H_2O$ (0.03 mmol) was added under argon, followed by an additional set of three freeze, pump and thaw cycles. The reaction mixture was vigorously stirred at 35°C for 7 h. To stop the polymerization and for the end-capping of the chain termini 0.05 mL azidobenzene was added under argon. After 15 min, 0.05 mL ethynylbenzene was added. After 15 min the solution was dissolved in 30 mL Chloroform, washed three times with EDTA solution (5 % in water) and three times with water. The organic phase was separated and dried with Na_2SO_4. The solvent was removed by rotary evaporation. The polymer was dried in vacuum. A yellow solid was obtained.

^{1}H NMR ($CDCl_3$, 400 MHz) δ ppm .8.37-8.26 (m), 8.20 (s), 8.04-7.99 (m), 7.94-7.88 (m), 7.83-7.78 (m), 7.59-7.51 (m), 7.51.7.44 (m), 7.41-7.35 (m), 7.06-6.98 (m), 3.13-3.07 (m), 2.28-2.03 (m), 1.68-1.55 (m), 1.42-0.97 (m), 0.92-0.65 (m). ^{13}C NMR ($CDCl_3$, 101 MHz) δ ppm 148.44, 137.11, 129.80, 128.79, 31.85, 30.32, 30.13, 29.97, 29.60, 29.55, 29.27, 22.63, 14.07. Molecular weight characteristics: M_n = 12 100 gmol^{-1}; M_w = 20 700 gmol^{-1}, *PDI* = 1.7

P4

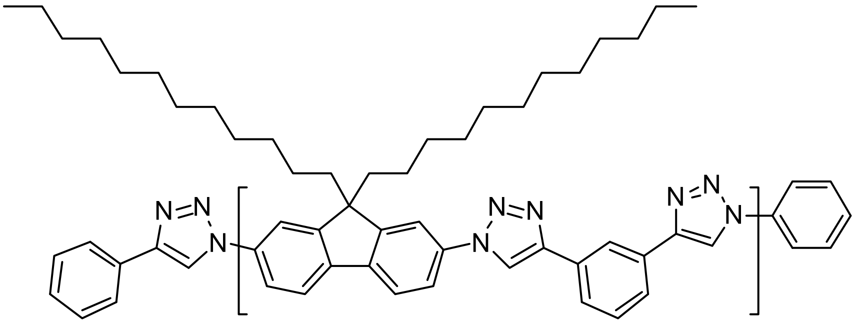
Poly[(9,9-didodecyl-2,7-fluorene)-1,4-(1,2,3-triazole) alt (1,4-phenylene-1,4-(1,2,3-triazole)]



In a 20 ml Schlenk-tube, 76.5 mg 2,7-diazido-9,9-didodecyl fluorene (0.13 mmol) and 16.5 mg 1,4-diethynyl-benzene (0.13 mmol) were dissolved in 5 mL THF. 0.5 mL (365 mg) triethylamine (3.61 mmol) and 5.2 mg sodium ascorbate (0.026 mmol) were added. To remove the oxygen three consecutive freeze, pump and thaw cycles were performed. Subsequently 3.2 mg $CuSO_4$ $5H_2O$ (0.013 mmol) was added under argon, followed by an additional set of three freeze, pump and thaw cycles. The reaction mixture was vigorously stirred at 35°C for 24 hours. To stop the polymerization and for the end-capping of the chain termini 0.03 mL azidobenzene was added under argon. After 15 min, 0.03 mL ethynylbenzene was added. After 15 min the solution was dissolved in 30 mL Chloroform, washed three times with EDTA solution (5% in water) and three times with water. The organic phase was separated and dried with Na_2SO_4. The solvent was removed by rotary evaporation. The polymer was dried in vacuum. A yellow solid was obtained. ^{1}H NMR ($CDCl_3$, 400 MHz) δ ppm .8.39-8.34 (m), 8.30(s), 8.20 (s), 8.12-8.05 (m), 7.96-7.86 (m), 7.83-7.77 (m), 7.59-7.51 (m), 7.50.7.44 (m), 7.41-7.36 (m), 7.01-6.95 (m), 2.19-2.05 (m), 1.69-1.58 (m), 1.43-0.96 (m), 0.88-0.62 (m). ^{13}C NMR ($CDCl_3$, 101 MHz) δ ppm 153.07, 148.09, 136.60, 129.89, 128.90, 126.45, 125.90, 120.78, 119.63. 117.59, 115.16, 56.32, 31.88, 30.32, 29.95, 29.58, 29.30, 22.66, 14.10. Molecular weight characteristics: M_n = 35 000 gmol^{-1}; M_w = 72 400 gmol^{-1}, *PDI* = 2.1.

P5

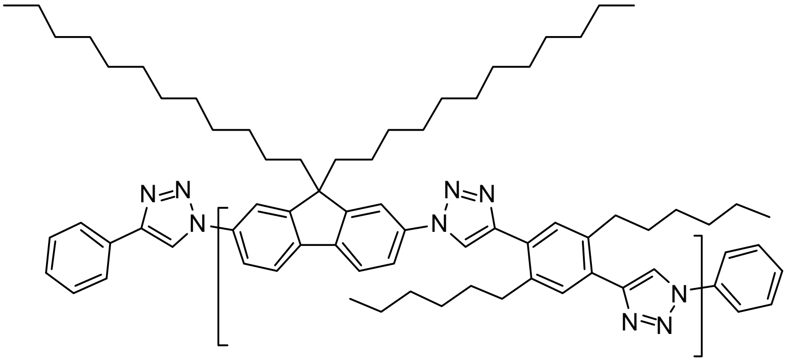
Poly[(9,9-didodecyl-2,7-fluorene)-1,4-(1,2,3-triazole) alt (1,3-phenylene-1,4-(1,2,3-triazole)]



In a 20 mL Schlenk-tube, 76.5 mg 2,7-diazido-9,9-didodecyl fluorene (0.13 mmol) and 16.5 mg 1,3-diethynyl-benzene (0.13 mmol) were dissolved in 5 mL THF. 0.5 mL (365 mg) triethylamine (3.61 mmol) and 5.2 mg sodium ascorbate (0.026 mmol) were added. To remove the oxygen three consecutive freeze, pump and thaw cycles were performed. Subsequently 3.2 mg $CuSO_4$ $5H_2O$ (0.013 mmol) was added under argon, followed by an additional set of three freeze, pump and thaw cycles. The reaction mixture was vigorously stirred at 35°C for 24 hours. To stop the polymerization and for the end-capping of the chain termini 0.03 mL azidobenzene was added under argon. After 15 min, 0.03 mL ethynylbenzene was added. After 15 min the solution was dissolved in 30 mL Chloroform, washed three times with EDTA solution (5% in water) and three times with water. The organic phase was separated and dried with Na_2SO_4. The solvent was removed by rotary evaporation. The polymer was dried in vacuum. A yellow solid was obtained. ^1H NMR ($CDCl_3$, 400 MHz) δ ppm .8.61-8.56 (m), 8.49-8.46(m), 8.20 (s), 8.04-7.98 (m), 7.96-7.84 (m), 7.82-7.79 (m), 7.59-7.53 (m), 7.50.7.45 (m), 7.40-7.35 (m), 2.20-2.11 (m), 1.75-1.57 (m), 1.43-1.02 (m), 0.86-0.78 (m), 0.76-0.66 (m). ^{13}C NMR ($CDCl_3$, 101 MHz) δ ppm 153.10, 148.44, 148.09, 140.44, 137.10, 136.60, 130.98, 129.80, 128.94, 128.80, 125.87, 120.56, 119.63. 118.14, 117.60, 115.25, 56.35, 31.57, 29.97, 29.59, 29.30, 22.64, 14.09. Molecular weight characteristics: M_n = 20 100 $gmol^{-1}$; M_w = 36 700 $gmol^{-1}$, *PDI* = 1.8

P6

Poly[(9,9-didodecyl-2,7-fluorene)-1,4-(1,2,3-triazole) alt (2,5-dihexyl-1,4-phenylene)-1,4-(1,2,3-triazole)]

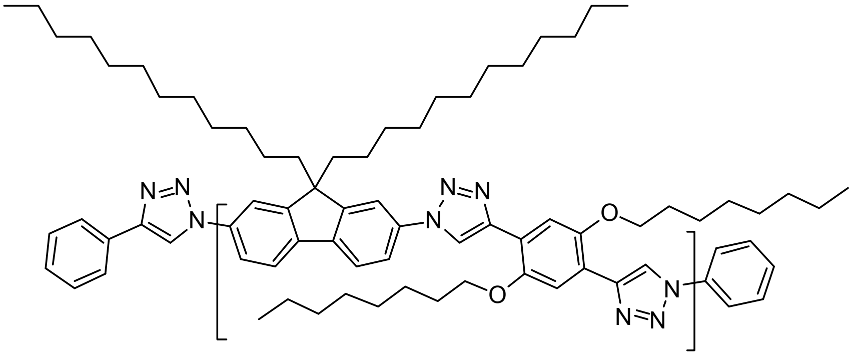


In a 20 mL Schlenk-tube, 52.53 mg 2,7-diazido-9,9-didodecyl fluorene (0.09 mmol) and 26.3 mg 1,4-diethynyl-2,5-dihexyl benzene (0.09 mmol) were dissolved in 3.4 mL THF. 0.34 mL (248 mg) triethylamine (2.45 mmol) and 5.2 mg sodium ascorbate (0.026 mmol) were added. To remove the oxygen three consecutive freeze, pump and thaw cycles were performed. Subsequently 3.2 mg $CuSO_4$ $5H_2O$ (0.013 mmol) was added under argon, followed by an additional set of three freeze, pump and thaw cycles. The reaction mixture was vigorously stirred at 35°C for 73 hours. To stop the polymerization and for the end-capping of the chain termini 0.02 mL azidobenzene was added under argon. After 15 minutes, 0.02 mL ethynylbenzene was added. After 15 min the solution was dissolved in 30 ml Chloroform, washed three times with EDTA solution (5% in water) and three times with water. The organic phase was separated and dried with Na_2SO_4. The solvent was removed by rotary evaporation. The polymer was dried in vacuum. A brown solid was obtained. ^1H NMR ($CDCl_3$, 400 MHz) δ ppm .8.74-8.68 (m), 8.20 (s), 8.18-8.14 (m), 7.94-7.87 (m), 7.83-7.76 (m), 7.59-7.52 (m), 7.51.7.44 (m), 7.41-7.30 (m), 7.06-6.97 (m), 4.37-4.28 (m), 3.14-3.06 (m), 2.22-1.95 (m), 1.73-1.59 (m), 1.53-0.96 (m), 0.92-0.81 (m), 0.80-0.66 (m) ^{13}C

NMR ($CDCl_3$, 101 MHz) δ ppm 152.00, 148.68, 142.92, 131.10, 128.79, 124.76, 120.34, 119.54, 114.33, 109.95, 68.00, 55.14, 44.77, 30.86, 28.53, 25.49, 21.65, 13.08. Molecular weight characteristics: M_n = 25 500 gmol^{-1}; M_w = 51 100 gmol^{-1}, *PDI* = 2.0.

P7

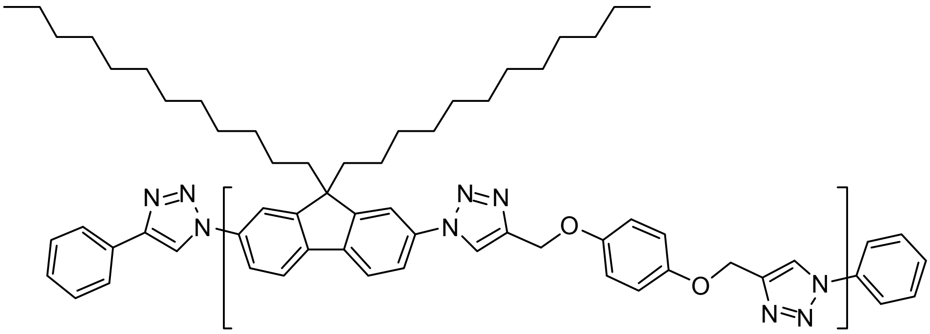
Poly[(9,9-didodecyl-2,7-fluorene)-1,4-(1,2,3-triazole) alt (2,5-bis(octyloxy)-1,4-phenylene)-1,4-(1,2,3-triazole)]



In a 20 mL Schlenk-tube, 153.0 mg 2,7-diazido-9,9-didodecyl fluorene (0.26mmol) and 99.0 mg 1,4-diethynyl 2,5-bis (octyloxy) (0.26 mmol) benzene were dissolved in 10 mL THF. 1.0 mL (730 mg) triethylamine (7.21 mmol) and 10.4 mg sodium ascorbate (0.052 mmol) were added. To remove the oxygen three consecutive freeze, pump and thaw cycles were performed. Subsequently 6.4 mg $CuSO_4$ $5H_2O$ (0.026 mmol) was added under argon, followed by an additional set of three freeze, pump and thaw cycles. The reaction mixture was vigorously stirred at 35°C for 24 h. To stop the polymerization and for the end-capping of the chain termini 0.05 mL azidobenzene was added under argon. After 15 min, 0.05 mL ethynylbenzene was added. After 15 min the solution was dissolved in 30 ml Chloroform, washed three times with EDTA solution (5% in water) and three times with water. The organic phase was separated and dried with Na_2SO_4. The solvent was removed by rotary evaporation. The polymer was dried in vacuum. A yellow, foil like solid was obtained. ^{1}H NMR ($CDCl_3$, 400 MHz) δ ppm 8.20 (s), 8.17 (s), 7.93 (t), 7.81 (d), 7.73 (s), 7.56 (t), 7.47 (t), 7.41-7.43 (m), 7.08 (s), 7.04 (s), 6.94 (s), 6.89 (s), 3.94 (t), 3.15-3.08 (m), 3.0-2.85 (m), 2.26-1.98 (m), 1.83-1.68 (m), 1.68-1.55 (m), 1.55-1.38 (m), 1.38-1.24 (m), 1.24-0.99 (m), 0.92-0.79 (m), 0.76-0.65 (m), 0.26 (s). ^{13}C NMR ($CDCl_3$, 101 MHz) δ ppm 154.06, 153.18, 147.92, 138.76, 130.30, 129.85, 128.99, 128.84, 128.48, 125.92, 121.16, 120.61, 119.76, 119.42, 117.63, 117.26, 115.42, 113.99, 69.50, 56.36, 33.56, 31.32, 29.58, 26.07, 22.70, 14.15. Molecular weight characteristics: M_n = 25 200 gmol^{-1}; M_w = 72 800 gmol^{-1}, *PDI* = 2.9

P8

Poly[(9,9-didodecyl-2,7-fluorene)-1,4-(1,2,3-triazole) alt (1,4-bis(methyloxy)-phenylene)-1,4-(1,2,3-triazole)]

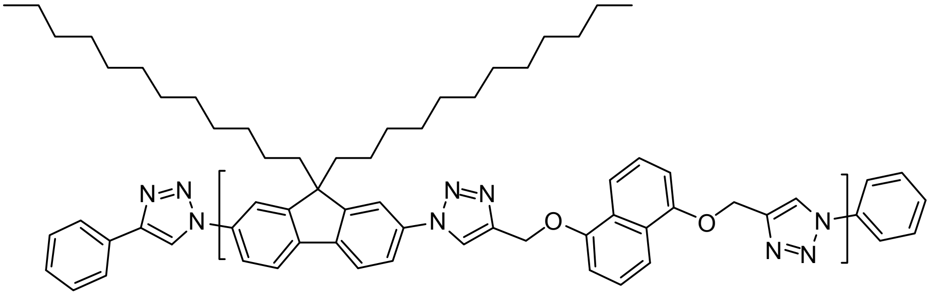


In a 20 mL Schlenk-tube, 100.0 mg 2,7-diazido-9,9-didodecyl fluorene (0.18 mmol) and 31.8 mg 1,4-bis(Prop-2-yn-1-yloxy) benzene (0.18 mmol) were dissolved in 6.5 mL THF. 0.7 mL (511 mg) triethylamine (5.05 mmol) and 7.2 mg sodium ascorbate

(0.036 mmol) were added. To remove the oxygen three consecutive freeze, pump and thaw cycles were performed. Subsequently 4.6 mg $CuSO_4$ $5H_2O$ (0.018 mmol) was added under argon, followed by an additional set of three freeze, pump and thaw cycles. The reaction mixture was vigorously stirred at 35°C for 24 hours. To stop the polymerization and for the end-capping of the chain termini 0.03 mL azidobenzene was added under argon. After 15 min, 0.03 mL ethynylbenzene was added. After 15 min the solution was dissolved in 30 ml Chloroform, washed three times with EDTA solution (5% in water) and three times with water. The organic phase was separated and dried with Na_2SO_4. The solvent was removed by rotary evaporation. The polymer was dried in vacuum. A yellow solid was obtained. ^1H NMR ($CDCl_3$, 400 MHz) δ ppm 8.21 (s), 8.16 (s), 8.12 (s), 8.05 (s), 8.03 (s), 7.92 (d), 7.81 (d), 7.88-7.79 (m), 7.72 (c), 7.56 (t), 7.47 (t), 7.40-7.31 (m), 7.03 (s), 7.00 (s), 6.94 (s), 6.99 (s), 3.14-3.08 (m), 2.18 (s), 2.13-2.00 (m), 1.73-1.60 (m), 1.49-1.39 (m), 1.27-1.00 (m), 0.87-0.81 (m), 0.68-0.58 (m). ^{13}C NMR ($CDCl_3$, 101 MHz) δ ppm 153.03, 152.94, 148.44, 145.22, 140.38, 136.54, 132.16, 130.26, 129.81, 128.94, 128.45, 128.31, 125.87, 121.11, 120.99, 120.56, 119.57, 117.60, 115.87, 115.43, 62.72, 56.26, 45.80, 40.34, 31.87, 29.93, 29.54, 29.30, 23.90, 22.65, 14.10, 8.61. Molecular weight characteristics: M_n = 11 800 gmol^{-1}; M_w = 21 000 gmol^{-1}, PDI = 1.8

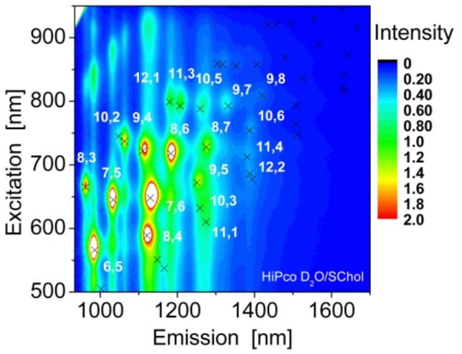
P9

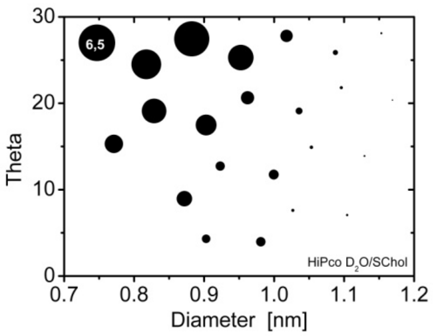
Poly[(9,9-didodecyl-2,7-fluorene)-1,4-(1,2,3-triazole) alt (1,5-bis(methyloxy)-naphthylene)-1,4-(1,2,3-triazole)]



In a 20 mL Schlenk-tube, 152.9 mg 2,7-diazido-9,9-didodecyl fluorene (0.26 mmol) and 61.8 mg 1,5-bis(Prop-2-yn-1-yloxy) (0.26 mmol) naphthalene were dissolved in 10 mL THF. 1.0 mL (730 mg) triethylamine (7.21 mmol) and 10.4 mg sodium ascorbate (0.052 mmol) were added. To remove the oxygen three consecutive freeze, pump and thaw cycles were performed. Subsequently 6.4 mg $CuSO_4$ $5H_2O$ (0.026 mmol) was added under argon, followed by an additional set of three freeze, pump and thaw cycles. The reaction mixture was vigorously stirred at 35°C for 24 h. To stop the polymerization and for the end-capping of the chain termini 0.05 mL azidobenzene was added under argon. After 15 min, 0.05 mL ethynylbenzene was added. After 15 min the solution was dissolved in 30 ml Chloroform, washed three times with EDTA solution (5% in water) and three times with water. The organic phase was separated and dried with Na_2SO_4. The solvent was removed by rotary evaporation. The polymer was dried in vacuum. A yellow solid was obtained. ^1H NMR ($CDCl_3$, 400 MHz) δ ppm 8.23 (s), 8.20 (s), 8.12 (s), 7.97-7.90 (m), 7.88-7.83 (m), 7.82-7.78 (m), 7.75-7.71 (m), 7.58-7.53 (m), 7.50-7.32 (m), 7.11 (s), 7.09 (s), 6.98 (s), 5.52 (s), 3.14-2.88 (m), 2.19-2.00 (m), 1.72-1.61 (m), 1.48-1.37 (m), 1.28-1.01 (m), 0.86-0.80 (m), 0.70-0.59 (m). ^{13}C NMR ($CDCl_3$, 101 MHz) δ ppm 153.87, 153.07, 148.43, 145.18, 140.18, 137.10, 136.56, 132.13, 130.23, 129.80, 128.31, 126.79, 125.87, 125.36, 121.00, 120.56, 119.56, 117.59, 115.45, 115.01, 106.29, 62.54, 56.30, 45.78, 40.33, 31.87, 29.93, 29.54, 29.31, 23.91, 22.65, 14.10, 8.61. Molecular weight characteristics: M_n = 10 700 gmol^{-1}; M_w = 28 000 gmol^{-1}, *PDI* = 2.6

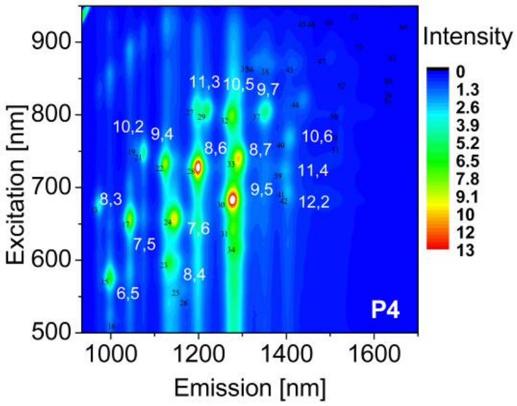
PL maps and *θ*/ Ø-plots of HiPco D_2O/SChol suspension:

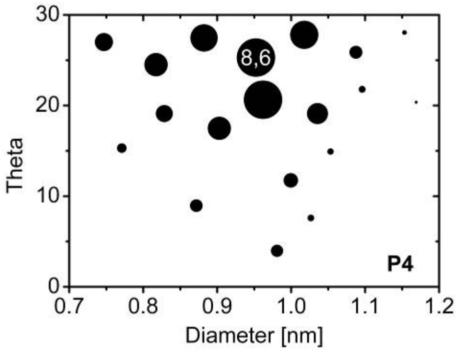




PL maps and *θ*/ Ø-plots of HiPco polymer suspensions P4 –P9:

P4

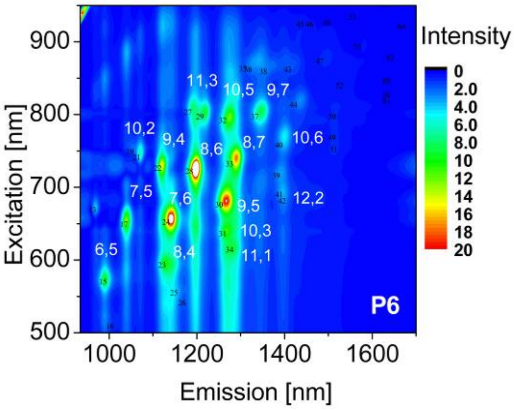


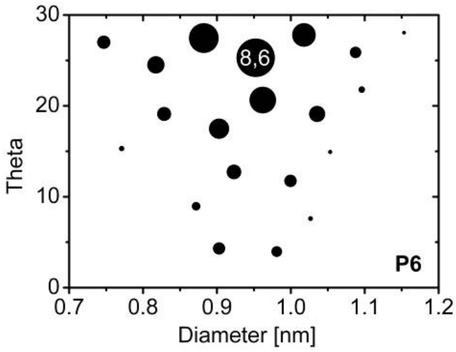


P5

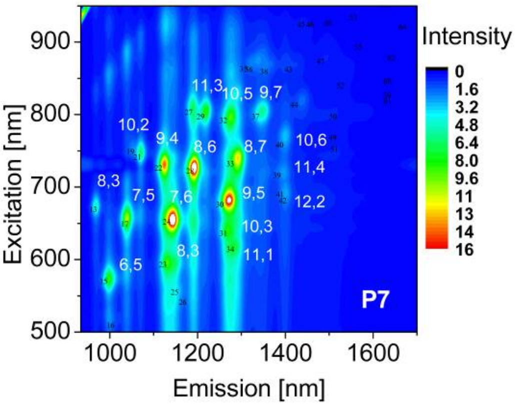
Polymer **P5** does not solve SWCNTs.

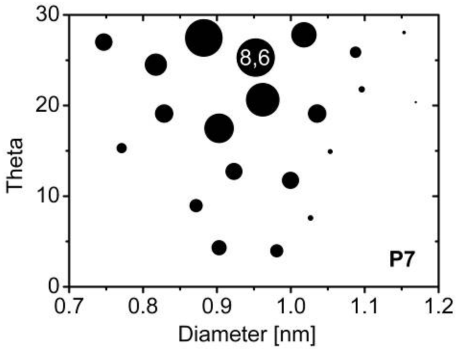
P6





P7

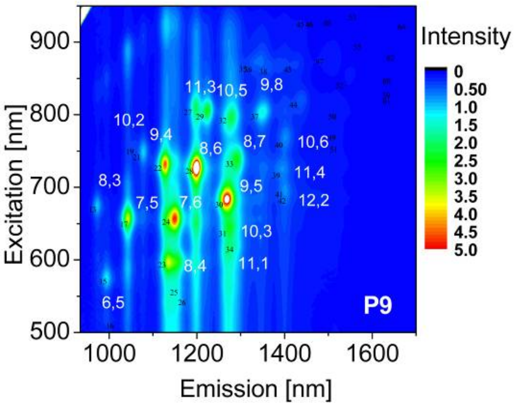


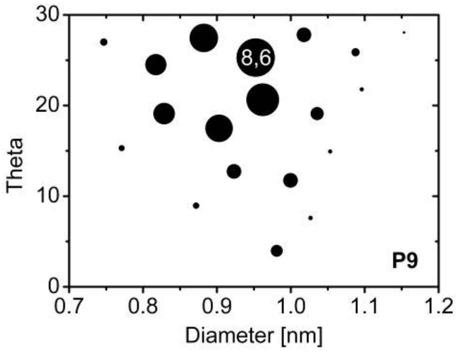


P8

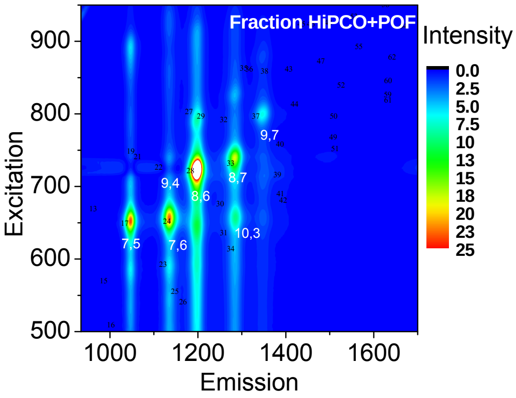
Polymer **P 8** does not solve SWCNTs.

P9

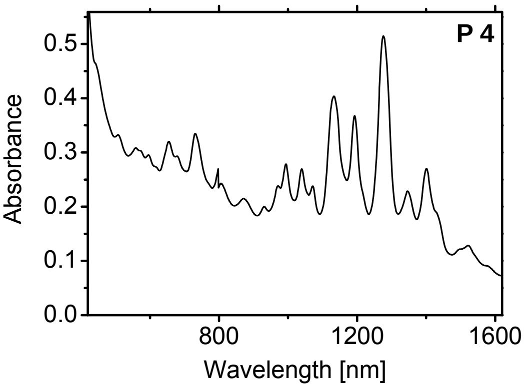




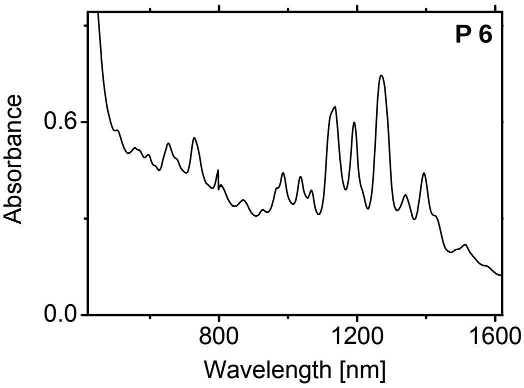
PL map of poly-2,7-dioctylfluorene (POF)

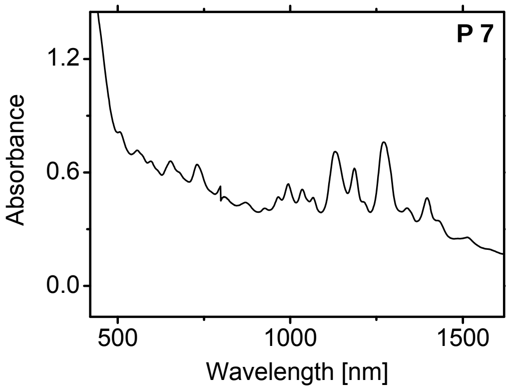


Absorptions spectra of HiPco SWCNT dispersions prepared with the polymers P4-P9

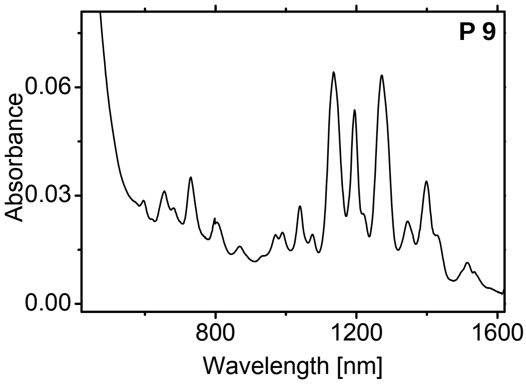


Polymer **P5** does not solve SWCNTs.

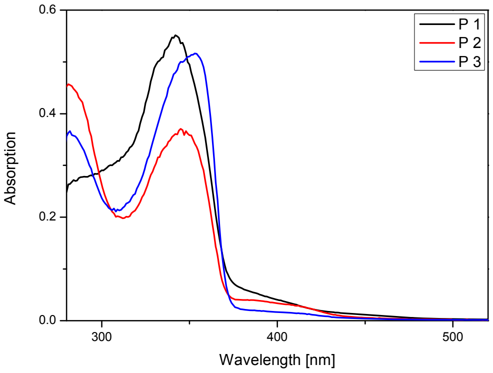




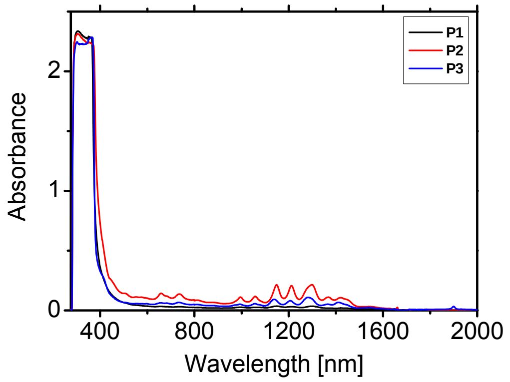
Polymer **P 8** does not solve SWCNTs.



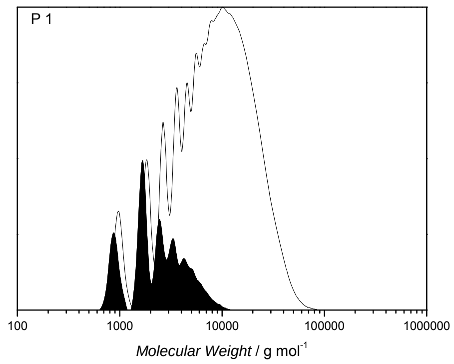
Absorptions spectra of the polymers P1-P3 (solvent: toluene)

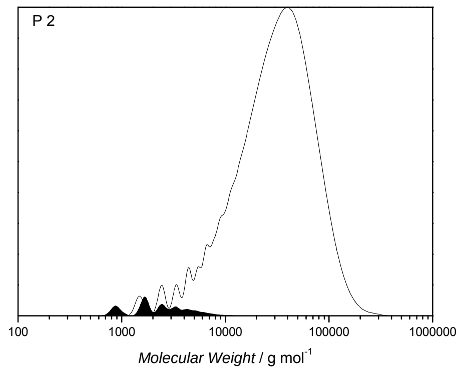


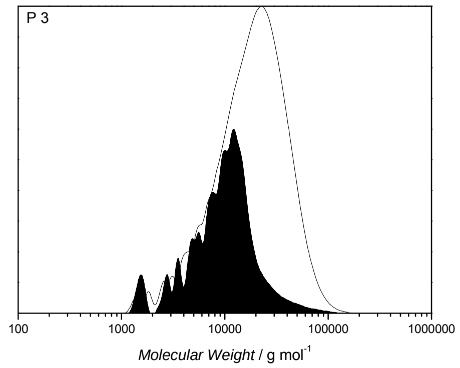
Absorptions spectra of HiPco SWCNT dispersions prepared with the polymers P1-P3 (spectra include the range of polymer absorption)

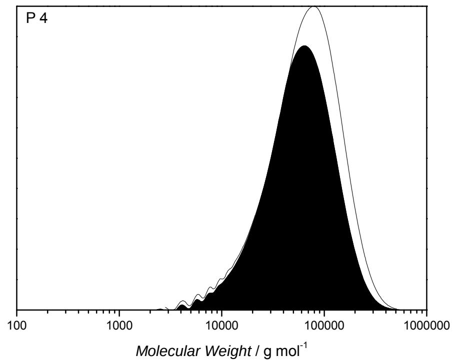


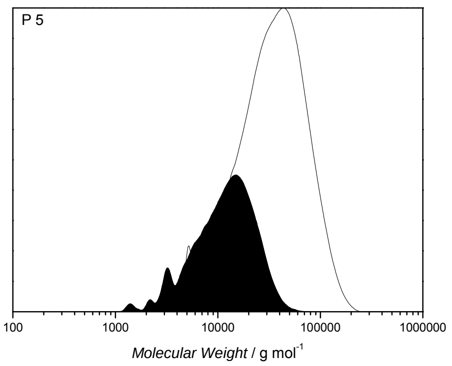
Molecular Weight Distribution of the Polymers P1 to P9. The solid line depicts the molecular weight distribution of the polymer-fraction which is soluble in THF, the black area the polymer-fraction soluble in toluene.

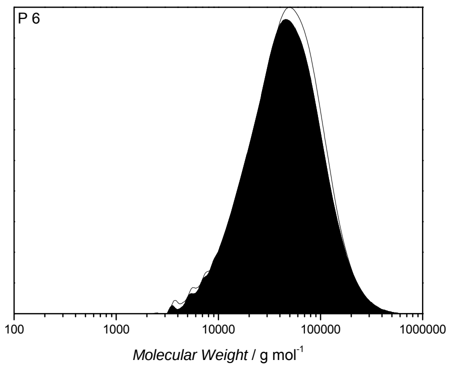


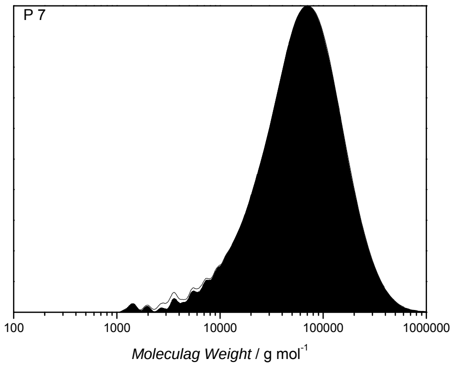


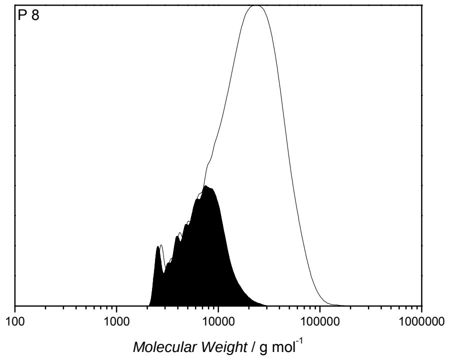


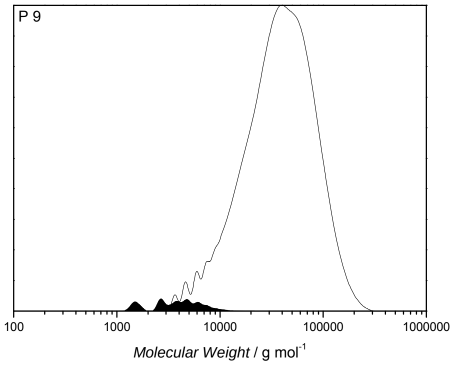












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