Electronic Supplementary Information

Thienyltriazine based conjugated porous organic polymers: tuning of porosity and band gap, and CO₂ capture

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Experimental section

General instrumentation

¹H and ¹³C NMR spectra of the monomers and precursors were recorded at room temperature on a Jeol JNM-ECS 400 spectrometer (400 MHz ¹H, 100 MHz ¹³C) or Bruker Avance 500 (500 MHz ¹H, 125 MHz ¹³C) spectrometer with tetramethylsilane as the internal reference; chemical shifts (δ) are given in parts per million (ppm). Spectra were processed using MestReNova v5 and referenced to residual protonated solvent signals (CDCl₃: ¹H 7.26 ppm, ¹³C 77.16 ppm). Fourier transform infrared spectroscopy (FTIR) spectra were recorded in the range of 4000-400 cm⁻¹ using the KBr pellet technique on a Perkin-Elmer RX1 IR Spectrometer. The thermal properties of CPPs were measured by thermogravimeter analyzer (Mettler Toledo, TGA/SDTA 851) from 40 °C to 800 °C at a heating rate of 10 °C min⁻¹ under nitrogen atmosphere. A Rigaku (Mini Flex II, Japan) powder X-ray diffractometer having Cu K α ($\lambda = 1.54059$ Å) radiation was used to record the X-ray diffraction (XRD) patterns. Solid-state UV-vis absorption spectra were recorded on a JASCO V-670 spectrophotometer. Elemental analysis was performed using Perkin Elmer CHN analyzer. A Carl Zeiss SUPRA 55VP microscope was used to obtain the field-emission scanning electron microscopy (FESEM) images after coating the sample with Au film. Transmission electron microscopy (TEM) images were recorded with a JEOL JEM-2100F microscope at the Department of Science and Technology, Fund for Improvement of S&T Infrastructure in Higher Educational Institutions (DST-FIST) facility of IISER Kolkata. The ¹H-¹³C CP/MAS NMR spectra were recorded on a Bruker AVANCE 500-MHz type (¹H, 500 MHz; ¹³C, 125 MHz) spectrometer at a spinning speed of 8 KHz and a relaxation delay of 10 seconds. UV-visible spectra were recorded on an Agilent Cary60 UV-vis absorption spectrophotometer.N2 adsorption-desorption isotherms were obtained on a Micromeritics Gemini VII surface area analyzer at 77 K and reported by Barrett-Joyner-Halenda surface/volume pore analysis. Samples were degassed at 120 °C under a N2 atmosphere for 12 h. The specific surface area was determined as per the Brunauer-Emmett-Teller (BET) method. CO₂ sorption data were recorded for pressures in the range 0–1.2 bar by the volumetric method using a BELSORP MAX instrument. Isosteric heats of adsorption (Q_{st}) were calculated using the Clausius-Clapeyron equation based on pure-component isotherms collected at three different temperatures of 273 K, 283 K and 298 K. Q_{st} is defined as: $Q_{st} = -R(\partial lnx/\partial(1/T))y$, where, x is the pressure, T is the temperature, R is the gas constant and y is the adsorption amount. These calculations are done through the "Heat of Adsorption" function embedded in the Belsorp adsorption/desorption data analysis software version 6.3.1.0.

Configurational biasMonte Carlo (CBMC) molecular simulation¹

The structures of **TT-CPC-1,2,3** was assumed to be hexagonal rigid in the crystallographic position, which is obtained from single-crystal XRD data. The simulation boxes representing **TT-CPC-1,2,3** adsorbents consist of $(1 \times 1 \times 1)$ unit cells for CO₂. All the calculations were performed at different temperatures. Interatomic interactions were modelled with standard Lennard-Jones potential and Coulombic potentials. Lennard-Jones parameters between unlike atom types were computed using the Lorentz-Berthelot mixing rules. For the pairwise interactions between host-guest atoms of the particular force field, the nonbonding parameter has been utilized. The long-range part of electrostatic interactions was handled using the Ewald summation technique with a relative precision of 10^{-6} . Periodic boundary conditions were applied in all three dimensions. For each state point, the CBMC simulation consists of 1 x 10^7 steps to guarantee equilibration, followed by 1 x 10^7 steps to sample the desired thermodynamic properties.

Materials

All reagents were obtained from commercial sources (Sigma Aldrich, Spectrochem, Merck and Alfa Aesar) and used as received without further purification unless otherwise specified. Toluene and Tetrahydrofuran (THF) were dried over sodium/benzophenone before use. Dry reactions were conducted in oven-dried glassware using a standard Schlenk line under an inert atmosphere of dry nitrogen. Dimethylformamide (DMF) for polymerization reaction was dried over calcium hydride followed by distillation under vacuum. Triethylamine was dried over potassium hydroxide (KOH) flakes. Dichloromethane (DCM) and chloroform (CHCl₃) were dried over calcium chloride. Solvents for Soxhlet extraction were used directly as obtained from commercial sources.



Scheme S1. Synthesis of the precursors used for polymerization.

2,4,6-tris(5-ethynylthiophen-2-yl)-1,3,5-triazine (1) was synthesized from 2-cyano thiophene (A) according to the procedure reported by Misra and the group.² ¹H data of all the compounds were consistent with the reported values. ¹H NMR of **1** (400 MHz, Jeol, CDCl₃): δ ppm 8.04 (d, 1H, J = 4 Hz); 7.30 (d, 1H, J = 4 Hz); 3.52 (s, 1H). Stannylation of compound **2** was carried out by using the method reported by Ogawa and the group.³ ¹H data of the compound matched with the reported data.¹H NMR of **3** (400 MHz, Jeol, CDCl₃): δ ppm 8.33 (d, 3H, J = 4 Hz); 7.27 (d, 3H, J = 8 Hz), 0.45 (s, 27H).

Procedure for the synthesis of TT-CPP1 [by the cyclotrimerisation reaction using Co₂(CO)₈ catalyst]

A 50 mL oven-dried three-neck round bottom flask fitted with a reflux condenser and a nitrogen purger on the top was charged with a small magnetic stirring bar. The reaction vessel was degassed and purged with nitrogen several times. The flask was then charged with 2,4,6-tris(5-ethynylthiophen-2-yl)-1,3,5-triazine (1) (1 g, 1 equiv) and 10 mL deoxygenated dioxane and the mixture was purged with nitrogen at room temperature for 20 minutes. In a separate single neck round-bottomed flask 10 mol % of dicobalt octacarbonyl, $Co_2(CO)_8$ was placed, followed by the addition of 5 mL of deoxygenated dioxane. The mixture was purged with nitrogen for 10 minutes. Meanwhile, the temperature of the flask containing the acetylene precursor 1was set to 110 °C. After completion of purging, the solution of cobalt catalyst was added dropwise to the reaction mixture, and the refluxing was continued for 1.5 h. The reaction mixture was then cooled, and the crude reaction mixture was suspended in conc. HCl(aq) toremove metal residues and was purified with a successiveSoxhlet extraction with water, methanol and ethanol. The polymer was further dried under vacuum for 3 h. Yield: 98%.

Procedure for the synthesis of TT-CPP2 (by the Sonogashira-Hagihara coupling reaction)

A 50 mL oven-dried three-neck round bottom flask fitted with a reflux condenser and a nitrogen purger on the top was charged with a small magnetic stirring bar. The reaction vessel was degassed and purged with nitrogen several times. Then the flask was charged with tribromo precursor (2, 0.67 equiv) and 2,4,6-tris(5-ethynylthiophen-2-yl)-1,3,5-triazine (1, 1 equiv). 7 mL anhydrous dimethylformamide (DMF) and 7 mL anhydrous triethylamine (Et₃N) were added to the flask under nitrogen and then Pd(PPh₃)₄ (5 mol%) and copper(I)iodide (CuI), (5 mol%). The reaction mixture was stirred at 130 °C for 72 hours under a nitrogen atmosphere. The mixture was cooled to room temperature, and the precipitated polymer was filtered and washed three times with dichloromethane, water, methanol and acetone (100 mL each) to remove any unreacted monomers or catalyst residues. Further purification of the polymer was done by Soxhlet extraction with methanol and then CHCl₃ for 24 hours each. The product was then dried under vacuum for 5 hours at 100 °C. Yield: 90%.

Procedure for the synthesis of TT-CPP3 (by the Glaser coupling reaction)

A 50 mL oven-dried three-neck round bottom flask fitted with a reflux condenser under atmospheric condition was charged with a small magnetic stirring bar. The flask was then charged with 2,4,6-tris(5-ethynylthiophen-2-yl)-1,3,5-triazine (1) (0.45 g, 1 equiv) and 10 mL of Et₃N and THF (1:1)mixture. This was followed by the addition of 5 mol% of Pd(PPh₃)₂Cl₂ and 5 mol% CuI. The mixture is then heated to 60 °C, and stirring continued as such for 72 hours. The mixture was cooled to room temperature, and the precipitated polymer was filtered and washed three times with dichloromethane, water, methanol and acetone (100 mL each) to remove any unreacted monomers or catalyst residues. Further purification of the polymer was done by Soxhlet extraction with methanol and then CHCl₃ for 24 hours each. The product was then dried under vacuum for 5 hours at 100 °C. Yield: 94%.

Procedure for the synthesis of TT-CPP4 (by the Stille coupling reaction)

2,4,6-tris(5-(trimethylstannyl)thiophen-2-yl)-1,3,5-triazine (**3**)(0.5 g, 0.6 mmol, 1 equiv) and 2,4,6-tris(5-bromothiophen-2-yl)-1,3,5-triazine (**2**) (0.226 g, 0.4 mmol, 0.67 equiv), tetrakis(triphenylphosphine)palladium(0) (5 mol% with respect to**3**) and 5 mL of mesitylene were added to a two-neck flask fitted with a reflux condenser under an inert atmosphere. The solution was further purged with nitrogen for around 15 minutes, and then the solution was heated at 170 °C for 3 days with stirring. After the reaction, the solution was poured into methanol, and a red precipitate was collected by filtration. Then, the red powder was purified by Soxhlet extraction with methanol, dichloromethane, tetrahydrofuran, and acetone for 24 h each. Finally, the purified red powder was vacuum-dried for 3 h. Yield: 92%.



Scheme S2. Synthesis of TT-CPP4.

Characterization of the synthesized polymers and monomers



Fig. S1 Solid state CP-MAS¹³C NMR spectrum of TT-CPP4.



Fig. S2 FTIR spectrum of TT-CPP4.



Fig. S3(a) FTIR spectra of Precursor 1 and TT-CPP1 and (b) FTIR spectra of Precursor 1, 2 and TT-CPP2.



Fig. S4 (a) FTIR spectra of Precursor 1 and TT-CPP3 and (b) FTIR spectra of Precursor 3, 2 and TT-CPP4.



Fig. S5 (a) SEM image of **TT-CPP4** at 1 μm scale and **(b)** TEM image of **TT-CPP4** at 2 μm scale.



Fig. S6 (a) N₂ adsorption-desorption isotherm of **TT-CPP4** at 77Kand (b) Pore size distribution of **TT-CPP4**.



Fig. S7 Powder X-ray diffraction pattern of TT-CPP4.



Fig. S8 TGA profile of TT-CPP4.



Fig. S9 Solid State UV-visible spectrum of TT-CPP4.



Fig. S10 Kubelka-Munk plot for band gap calculation of TT-CPP4.

 Table S1. Elemental Analysis of TT-CPP1, TT-CPP2, TT-CPP3 and TT-CPP4.

Polymer	Theoretically calculated	Experimental value	
	value		
TT-CPP1 (C21H9N3S3)	C = 63.13, H = 2.27, N = 10.52	C = 58.91, H = 1.62, N = 8.41	
TT-CPP2 (C40H12N686)	C = 62.48, H = 1.57, N = 10.93	C = 56.15, H = 1.21, N = 8.12	
TT-CPP3 (C42H12N686)	C = 63.62, H = 1.53, N = 10.60	C = 60.08, H = 1.25, N = 8.01	
TT-CPP4 (C30H12N686)	C = 55.53, H = 1.86, N = 12.95	C = 52.23, H = 1.31, N = 10.21	



Fig. S11 FTIR spectra of TT-CPP (1-4) after treatment with the organic solvent, acid, and base for 3 days.



Fig. S12 Recycling efficiency of TT-CPP1 for CO₂ uptake.

Entry	Material	SABET	Temperature	Pressure	Adsorption	Reference
		$(m^2 g^{-1})$	(K)	(bar)	capacity	
					(mmol g ⁻¹⁾	
1	TT-CPP1	545	263	1	2.62	This work
			273		2.18	
			298		1.27	
	TT-CPP2	511	263		1.75	
			273		1.63	
			298		1.08	
	TT-CPP3	491	263		1.42	
			273		1.22	
			298		0.76	
2	Py-azo-COP	700	273	1	1.93	ACS Omega, 2017 , 2,
				15.5	4.14	3572–3582.
3	Zn-CMP	791	298	1.01	1.33	<i>ChemSusChem</i> , 2014 , <i>7</i> , 2110–2114.
4	CMP1	258	298	1	0.46	Polymer, 2016, 90, 187–
	CMP2	567			0.67	192.
5	NWPTPE	508	298	1	0.68	J. Polym. Sci., Part A:
	NWPPYR	824			0.93	Polym. Chem.,
						2017 , <i>55</i> , 3862–3867.
6	НСТРР	582	273	1	2.79	New J. Chem., 2017, 41,
	НСТРА	921			2.27	3915–3919.
	НСТРМ	670			2.14	
7	TCMP-0	963	273	1	2.38	Polym. Chem., 2012, 3,
			298		1.34	928–934.
	CMP-0	1018	273		2.1	
			298		1.21	
	TNCMP-2	995	273		2.62	
			298		1.45	
	ТСМР-3	691	273		2.25	
			298		1.26	
	TCMP-5	494	273		1.22	
0	TDD DD CMD	657	298	1	0.68	
8	TPA DD CMP	657	273	1	2.5	Mater. Chem. Front.,
	TPM DD CMP	343			2.94	2017, 7, 807–872.
	SDE BD CMD	1008			3.70	
0		014	273	1	3.23	Cham Eur 1 2016 22
,	P1	834	215	1	2 53	7170 7183
	P3	873			2.55	/1///105.
10	ACMP-C	629	195	1.06	11 14	Macromolecules 2010 43
10		02)	273	1.00	1 56	5508-5511
			298		1.08	
	ACMP-C6	380	195		9.97	
			273		0.79	
			298		0.54	
	ACMP-N	46	195		11.5	
			273		1.16	
			298		0.79	
11	CMP1	767	273	1	2.94	Macromolecules, 2019, 52,
	CMP2	624			2.7	3935–3941.
	CMP3	780			2.37	

Table S2. Summary of the CO_2 adsorption capacity data of various CPPs.

CMP-1-AMD1 316 273 298 0.96 1.51 0.96 325. CMP-1-AMD2 264 273 1.51 0.96 0.96 CMP-1-AMD3 119 273 1.31 0.96 0.92 CMP-1-AMD4 59 273 1.31 0.98 0.92 CMP-1-AMD5 37 273 1.13 0.83 0.44 CMP-1-AMD9 68 273 0.64 0.87 CMP-1-AMD9 68 273 0.82 0.87 CMP-1-AMD9 68 273 0.82 0.82 PP_CMP@mmm 1928 273 0.82 0.82 PP_CMP@omp 43 273 0.66 0.64 TP-BF-CMP 1306 273 1 3.21 Macromolecules, 278 PP_CMP@omm 81 273 0.63 0.64 0.64 TP-ABF-CMP 707 273 1.3 3.21 Macromolecules, 2014, 4, 647-6 14 Py-BF-CMP 590 273 1 1.58 ASC Adw, 2014, 4, 647-6	12	CMP-1-NH ₂	656	273	1	1.65	Polymer, 2014, 55, 321–
CMP-1-AMD1 316 273 298 1.51 0.96 1.46 CMP-1-AMD2 264 273 1.45 298 0.92 0.92 CMP-1-AMD3 119 273 1.31 298 0.83 0.71 CMP-1-AMD5 37 273 1.13 CMP-1-AMD9 68 273 0.64 CMP-1-AMD9 68 273 0.64 CMP-1-AMD9 68 273 0.64 CMP-1-AMD9 68 273 0.54 PP_CMP@mmm 1928 273 1.36 2781-2783. PP_CMP@mom 81 273 0.64 2781-2783. PP_CMP@mom 81 273 1.36 2781-2783. 15 HP_c-CMP 1306 273 1.83 2018, 51, 3443-3449. 15 HP_c-CMP 662 273 1.83 2018, 51, 3443-3449. 16 CMP 772 298 1.01 1.61 Nat. Commun., 2013, 4, 1960. 174		_		298		0.96	325.
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HCMP-2 58 273 1.23 6322-6333. HCMP-3 50 273 1.16 6322-6333. HCMP-4 28 273 0.98 6322-6333. 22 PTEB aerogel 1701 273 1 3.47 Adv. Mater., 2014, 26, 8053-8058. 23 CMP-PM 416 273 1.01 1.99 Chem. Eur. J., 2018, 24, 7480-7488. 24 BO-CMP-1 440 273 1 1.8 Macromolecules, 2018, 51, 947-953. 600-CMP-2 540 540 1.16 1.16 1.16	21	HCMP-1	308	273	1	1.7	Macromolecules, 2016, 49.
HCMP-3 HCMP-4 50 28 273 273 1.16 0.98 22 PTEB aerogel 1701 273 1 3.47 Adv. Mater., 2014, 26, 8053-8058. 23 CMP-PM 416 273 1.01 1.99 Chem. Eur. J., 2018, 24, 7480-7488. 24 BO-CMP-1 440 273 1 1.8 Macromolecules, 2018, 2.41 51, 947-953. BO-CMP-2 540 1.16 1.7 1.7 1.16		HCMP-2	58	273	_	1.23	6322–6333.
HCMP-4 28 273 0.98 22 PTEB aerogel 1701 273 1 3.47 Adv. Mater., 2014, 26, 8053-8058. 23 CMP-PM 416 273 1.01 1.99 Chem. Eur. J., 2018, 24, 7480-7488. 24 BO-CMP-1 440 273 1 1.8 Macromolecules, 2018, 51, 947-953. 6BO-CMP-2 540 1.16 1.7 1.17		HCMP-3	50	273		1.16	
22 PTEB aerogel 1701 273 1 3.47 Adv. Mater., 2014, 26, 8053–8058. 23 CMP-PM 416 273 1.01 1.99 Chem. Eur. J., 2018, 24, 7480–7488. 24 BO-CMP-1 440 273 1 1.8 Macromolecules, 2018, 2.41 51, 947–953. BO-CMP-1 390 1.16 1.7 1.7 1.7		HCMP-4	28	273		0.98	
23 CMP-PM CMP-PM-Me 416 241 273 1.01 1.99 1.42 Chem. Eur. J., 2018, 24, 7480–7488. 24 BO-CMP-1 440 273 1 1.8 Macromolecules, 2018, 2.41 51, 947–953. BO-CMP-1 390 1.16 1.7 1.7	22	PTEB aerogel	1701	273	1	3.47	<i>Adv. Mater.</i> , 2014 , <i>26</i> , 8053–8058.
CMP-PM-Me 241 273 1.42 7480–7488. 24 BO-CMP-1 440 273 1 1.8 Macromolecules, 2018, BO-CMP-2 1030 2.41 51, 947–953. 51, 947–953. oBO-CMP-1 390 1.16 1.7 1.42	23	CMP-PM	416	273	1.01	1.99	Chem. Eur. J., 2018, 24.
24 BO-CMP-1 440 273 1 1.8 Macromolecules, 2018, BO-CMP-2 1030 273 1 1.8 51, 947–953. oBO-CMP-1 390 1.16 1.7 1.7		CMP-PM-Me	241	273		1.42	7480–7488.
BO-CMP-2 1030 2.41 51, 947–953. oBO-CMP-1 390 1.16 1.7	24	BO-CMP-1	440	273	1	1.8	Macromolecules, 2018,
oBO-CMP-1 390 1.16 oBO-CMP-2 540 1.7		BO-CMP-2	1030			2.41	51, 947–953.
oBO-CMP-2 540 1.7		oBO-CMP-1	390			1.16	
		oBO-CMP-2	540			1.7	

25	CMP-1	837	298	1	1.18	Chem. Sci., 2011 ,
	CMP-1-(CH ₃) ₂	899			0.94	2, 1173–1177.
	CMP-1-(OH) ₂	1043			1.07	
26	BFCMP-1	1316	273	1.13	2.45	<i>Polymer</i> , 2015 , <i>61</i> , 36–41
			298		1.39	
	BFCMP-2	1470	273		2.77	
		015	298	1.10	1.64	
27	РРТВС	917	273	1.13	2.93	Macromol. Chem. Phys.,
	DIATE	704	298		1.71	2015 , <i>216</i> , 504–510.
	PMIBC	/04	2/3		2.86	
	DDETDC	702	290		1.79	
	FFEIDU	/02	273		2.23	
	PMFTRC	540	273		1.25	
		540	298		1.90	
28	MFCMP-1	840	273	1	3.69	I Mater Chem A 2014
20		010	275		5.07	<i>2</i> , 13422–13430.
29	СМР-ҮА	1410	273		1.25	Macromolecules,
	CMD CO 1D2	1005	298		1.9	2017, 50, 4993–5003.
	CMP-SO-1B2	1085	2/3		1.19	
	CMD SO 1D2	1090	298		1.92	
	CMP-50-1B5	1080	2/3		1.22	
30		54	290	1	0.65	I Pohym Sci Part 1.
30	CK-COP-2	615	275	1	2.21	<i>D. Polym. Sci., Part A.</i> <i>Polym. Chem.</i> , 2017 , <i>55</i> , 2383–2389.
31	ThPOP-1	1050	273	1	3.41	Polvm. Chem., 2016, 7.
	ThPOP-2	160			0.91	5031–5038.
32	Porp-TPE	547	273	1.05	2.09	Polym. Chem.,
	Porp-Py-CMP	31	273	1.05	1.29	2019 , <i>10</i> , 819–822.
33	Por-Py-CMP	1014	273	1	3	RSC Adv., 2016, 6,
	·		298		1.86	75478–75481.
34	DA-CMP1	662	273	1.13	2.28	J. Mater. Chem. A, 2015,
			298		1.35	<i>3</i> , 21185–21193.
	DA-CMP2	603	273		1.64	
			298		0.95	
	Azo-CMP1	1146	273		3.72	
			298		2.15	
	Azo-CMP2	898	272			
25		011	298	1	1.96	Dehm. Cham. 201(7
35	SCMP-COOH@1	911	298		1.39	<i>Polym.</i> Cnem., 2010 , <i>7</i> ,
	SCMP-COOH@3	820			1.07	4599-4002.
26	ZnP-5N3-CMPs	711	273	1	1	Chem Commun 2017 53
30		/11	298	1	0.59	11422–11425.
	ZnP-25N3-CMPs	685	273		1.23	
			298		0.7	
	ZnP-50N3-CMPs	654	273		1.98	
			298		1.11	
	ZnP-75N3-CMPs	565	273		1.64	
			298		0.98	
	ZnP-100N3-CMPs	477	273		1.57	
			298		0.91	

	ZnP-5F-CMPs	430	273		1.32	
			298		0.77	
	ZnP-25F-CMPs	352	273		1.91	
			298		1.18	
	ZnP-50F-CMPs	240	273		2.95	
			298		2.04	
27	DC7N 1	1002	270	1	2.61	Bohum Chom
3/	PCZN-1 DCZN 2	1005	2/3	1	2.57	Polym. Cnem.,
	PCZN-2	607			2.36	2017, 8, 7240-7247.
	PCZN-3	714			2.54	
	PCZN-4	3/4			2.02	
	PCZN-5	707			2.29	
	PCZN-6	718			2.82	
	PCZN-7	1058			2.91	
	PCZN-8	1126			3.18	
	PCZN-9	690			2.93	
	PCZN-10	391			1.7	
38	PCTF-8	625	273	1	2.47	J. Mater. Chem. A, 2016,
			293		1.41	4, 13450–13457.
39	BCMP3	950	273	1	2.41	Chem. Eur. J., 2015 , 21,
			298		1.61	17355–17362.
40	LKK-CMP-1	467	273	1	2.22	Ind Eng Chem Res.
			298	-	1 38	2018 57 9254–9260
11	PCTF-1	2235	273	1	3.22	Chem Commun
41	1011-1	2233	275	1	1.84	2013 <i>A</i> 9 3961_3963
	DCTE 2	784	270		1.04	2013, 47, 5701-5705.
	1011-2	/04	273		1.02	
12		1610	290	1	0.99	M
42	CPOP-8	1010	2/3	1	5.75	<i>Macromolecules</i> ,
	CPOP-9	2440			4.13	2014, 47, 5926–5931.
	CPOP-IU	1110	070	1	3.30	
43	PIA-I	52	273	1	0.84	<i>Chem. Commun.</i> , 2014,
	PTA-2	62	273		1.25	50, 8002-8005.
			303		0.59	
	РТА-3	450	273		1.48	
			303		0.77	
44	BILP-101	536	298	1	2.43	<i>Chem. Commun.</i> , 2015 , <i>51</i> ,
						13393–13396.
45	PAF-33	821	273	1	2.16	Polym. Chem., 2014 , 5,
			298		1.25	2266–2272.
	PAF-33-NH ₂	370	273		1.19	
			298		0.75	
	РАГ-33-СООН	445	273		1.94	
			298		1.21	
	PAF-34	953	273		2.5	
			298		1.39	
	PAF-34-OH	771	273		2.21	
			298		1.25	
	PAF-35	567	273		1.77	
			298		1.01	
16	Cu/RF./RIPI PI_1	380	273	1	2.57	I Phys Cham C
40		300	213	1	2.37	2015 110 8174 8182
47	BILD 15	118	273	1	2.68	Empiron Sci Tachnol
4/	DILT-13	440	213	1	2.00	2015 40 4715 4702
		125	298		1.82	2013, 49, 4/13-4/23.
	BILP-10	435	2/3		2./	
			298		1.83	
	BILP-15(AC)	862	2/3		5.43	

			298		2.29	
	BILP-16(AC)	843	273		3.46	
			298		2.32	
48	TBILP-1	117	273	1	2.91	Macromolecules, 2014, 47,
			298		1.98	8328–8334.
49	BILP-10	787	273	1	4.02	J. Mater. Chem. A, 2014,
			298		2.52	2, 12492–12500.
	BILP-11	658	273		3.09	
	BIL P-13		298		2	
	DILI-15	677	273		2.57	
			298		1.8	
50	NPOF-1	2062	298	1	1.52	J. Phys. Chem. C, 2016,
	NPOF-1-NO ₂	1295			2.52	120, 2592–2599.
	NPOF-1-NO ₂ (xs)	749			2	
	NPOF-1-NH ₂	1535			3.77	
	NPOF-1-NH ₂ (xs)	1074			2.93	
51	ALP-5	801	273	1	4.46	J. Mater. Chem. A, 2015,
			298		2.94	<i>3</i> , 20586–20594.
	ALP-6	698	273		3.42	
			298		2.17	
	ALP-7	412	273		2.5	
			298		1.55	
	ALP-8	517	273		3.05	
			298		1.97	



Fig. S13 ¹H NMR spectrum of C (400 MHz, CDCl₃).



Fig. S14 ¹H NMR spectrum of $1(400 \text{ MHz}, \text{CDCl}_3)$.



Fig. S15 ¹H NMR spectrum of3 (400 MHz, CDCl₃).

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