Electronic Supplementary Information

Green solvents for organic thin-film transistor processing

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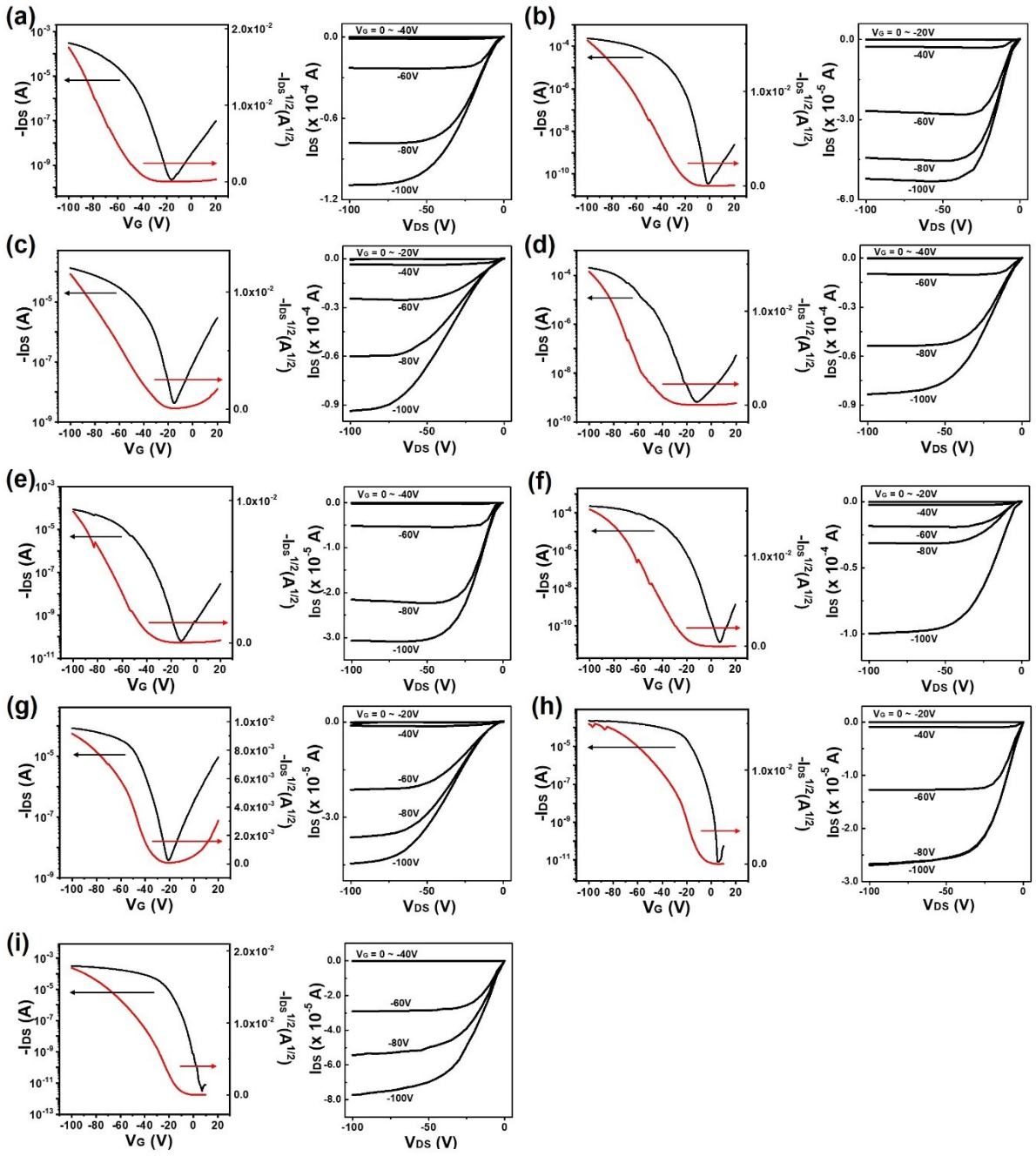

Figure S1. Transfer and output characteristics of the TFTs devices fabricated from (a) chlorobenzene, (b) 1,2-dichlorobenzene, (c) chloroform, (d) *o*-xylene, (e) toluene, (f) diethyl succinate, (g) isopropyl acetate, (h) Purasolv EHL, and (i) Agnique AMD810, respectively. Channel widths and lengths were 1000 and 50 μm, respectively.

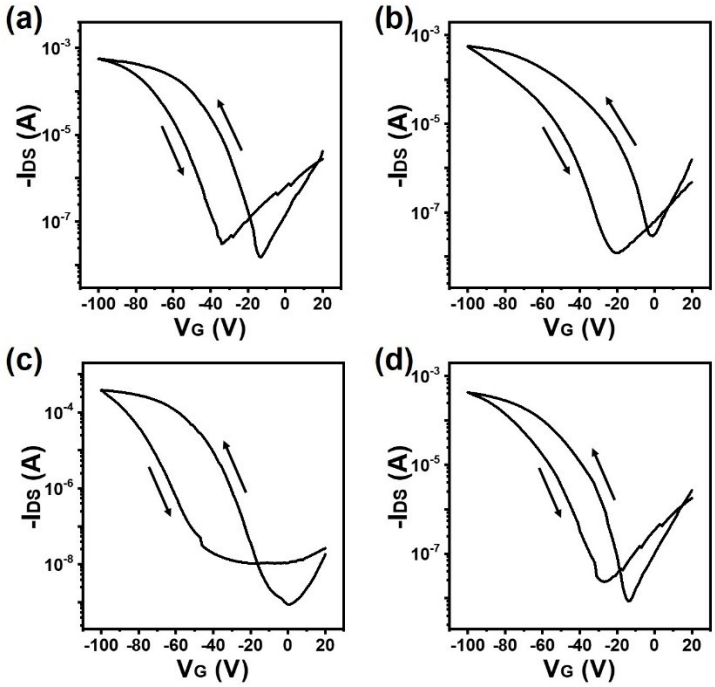

Figure S2. Forward and backward transfer characteristics of the TFT devices fabricated from (a) isobutyl acetate, (b) dimethyl carbonate, (c) anisole, and (d) t-amyl methyl ether. Channel width and length of 1000 μm and 50 μm, respectively, were employed for all of the devices.

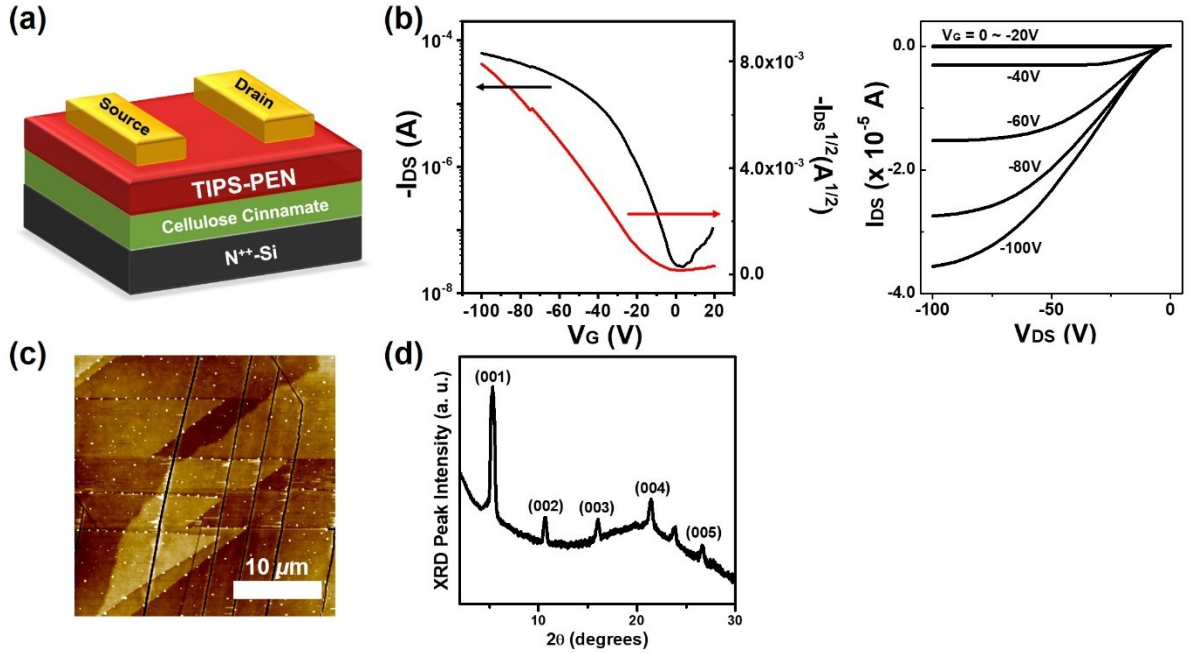

Figure S3. (a) Bottom-gate/top-contact (BG/TC) TFT geometry, (b) transfer and output characteristics, (c) AFM topography images (30 × 30 μm^2), and (d) XRD scans for anisole-processed TIPS-PEN on cellulose cinnamate dielectrics.

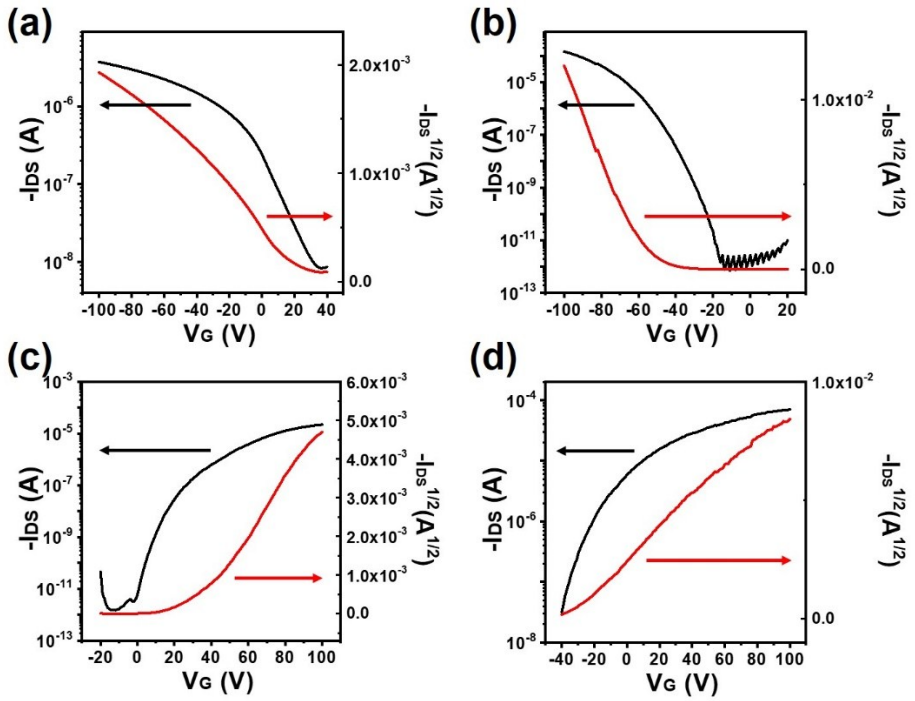

Figure S4. Transfer characteristics of the TFTs devices fabricated from (a) cyclopentyl methyl ether-processed P3HT, (b) isopropyl acetate-processed C8-BTBT, (c) anisole-processed PTCDI-C8, and (d) Purasolv EHL-processed PDIF-CN2.

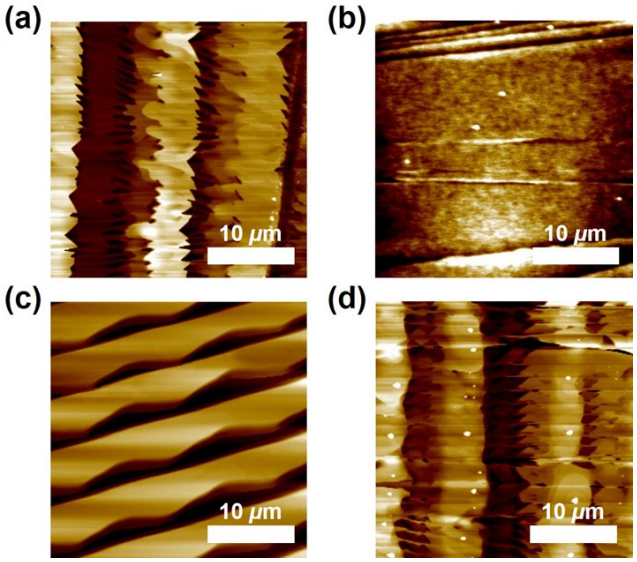

Figure S5. AFM topography images (30 × 30 μm^2) of TIPS-PEN based films from (a) isobutyl acetate, (b) dimethyl carbonate, (c) anisole, and (d) t-amyl methyl ether, respectively. The scale bar denotes 10 μm.

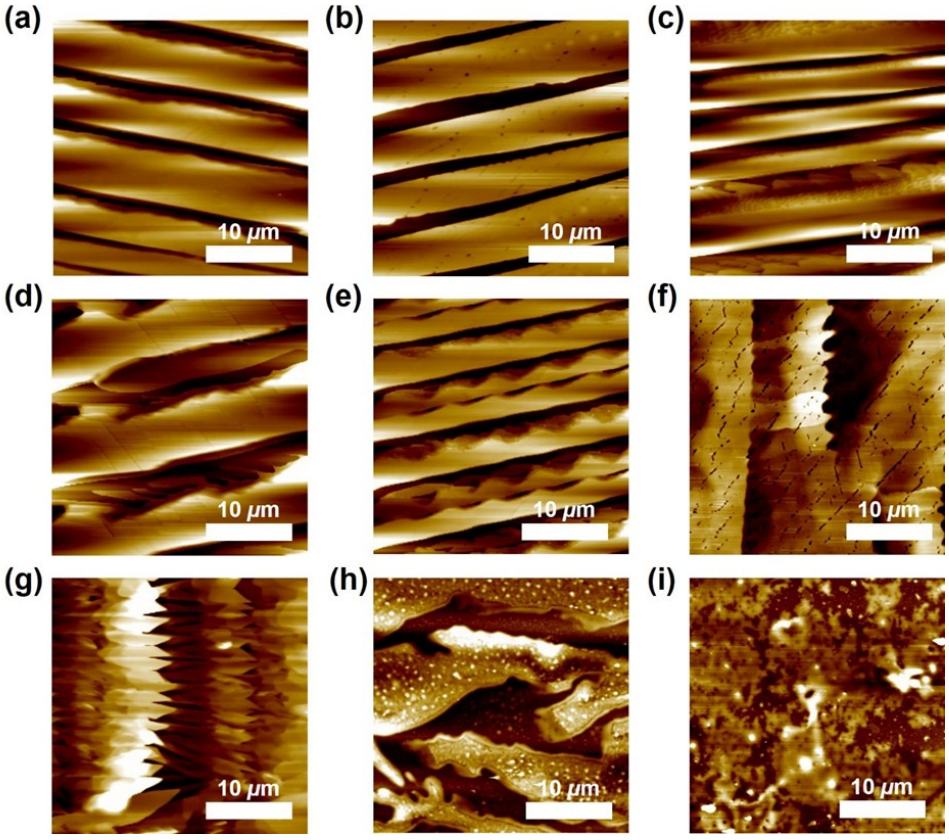

Figure S6. AFM topography images (30 × 30 μm^2) of TIPS-PEN based films from (a) chlorobenzene, (b) 1,2-dichlorobenzene, (c) chloroform, (d) *o*-xylene, (e) toluene, (f) diethyl succinate, (g) isopropyl acetate, (h) Purasolv EHL, and (i) Agnique AMD810, respectively. The scale bar denotes 10 μm.

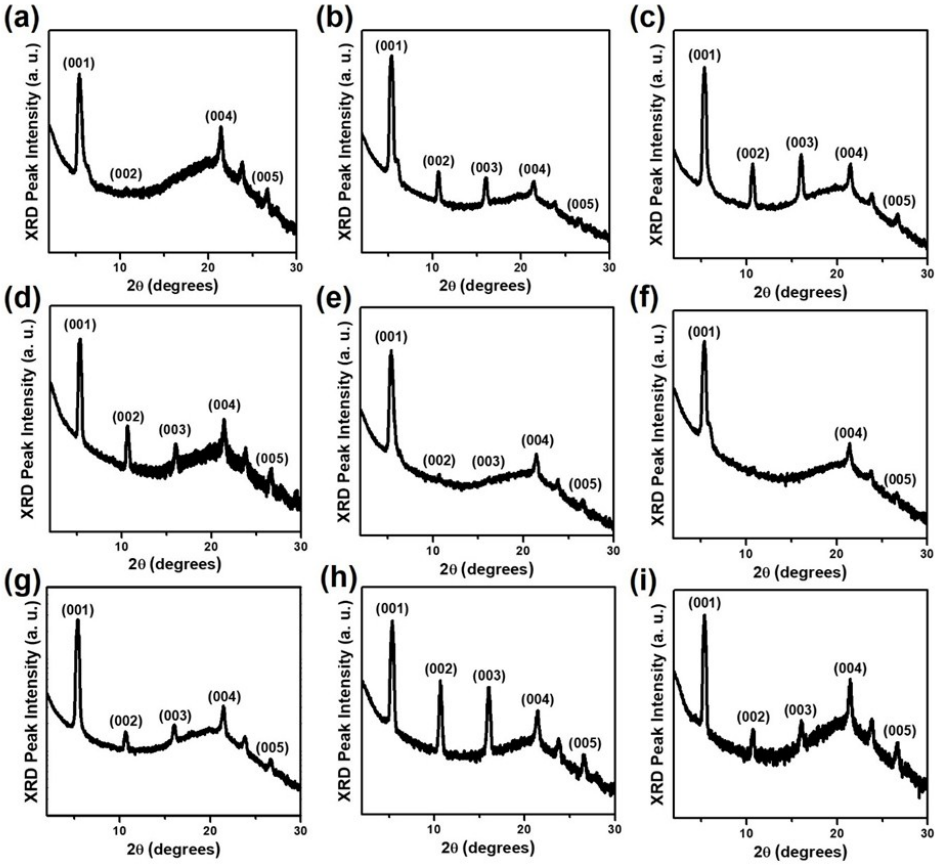

Figure S7. XRD scans for TIPS-PEN based films from (a) chlorobenzene, (b) 1,2-dichlorobenzene, (c) chloroform, (d) *o*-xylene, (e) toluene, (f) diethyl succinate, (g) isopropyl acetate, (h) Purasolv EHL, and (i) Agnique AMD810, respectively.

Table S1. Summary of the optimization conditions for TIPS-PEN processed TFTs from different solvents

Solvent classification	Solvent	Conc.[a] (mg/mL)	Substrate Temp. (°C)	Shearing speed[a] (mm/min)	Annealing Temp. (°C)	Annealing Time[a] (hr)
Ester	Diethyl succinate	1-8 (8)	120-140	1-20 (10)	140	1-5 (2)
	Dimethyl succinate	1-3 (1)	120-140	1-3 (1)	140	1-5 (2)
	Ethyl-L-lactate	1-3 (1)	80-100	1-3 (1)	80	1-5 (3)
	γ-valerolactone	1-3 (3)	120-140	1-3(1)	140	1-5 (2)
	Isobutylacetate	1-8 (8)	60-80	1-20 (20)	70	1-5 (2)
	Isopropylacetate	1-8 (8)	50-70	1-20 (20)	50	1-5 (3)
	IRIS	1-3 (3)	120-140	1-3 (1)	140	1-5 (2)
	Isoamyl acetate	1-3 (1)	70-90	1-3 (1)	80	1-5 (2)
	Loxanol	1-3 (3)	140	1-5 (5)	140	1-5 (2)
	Methyl formate	1-3 (<1)	25	1-3 (1)	25	1-5 (3)
	n-amyl acetate	1-3 (1)	80-100	1-3 (1)	80	1-5 (2)
	Pentyl-oxopentanoate	1-3 (3)	140	1-5 (5)	140	1-5 (2)
	Purasolv EHL	1-8 (3)	140	1-20 (5)	140	1-5 (2)
Carbonate	Diethyl carbonate	1-3 (1)	70-90	1-3 (1)	70	1-5 (2)
	Dimethyl carbonate	1-8 (1)	70-90	1-20 (1)	70	1-5 (3)
Ketone	Methyl ethyl ketone	1-3 (1)	40-60	1-3 (1)	45	1-5 (3)
Aromatic	p-cymene	1-3 (1)	100-120	1-3 (1)	110	1-5 (3)
	o-xylene	3-8 (8)	70-90	3-20 (20)	85	1-5 (2)
	toluene	1-8 (8)	70-90	24-20 (20)	90	1-5 (3)
Ether	Anisole	1-8 (8)	90-110	1-20 (20)	90	1-5 (2)
	Cyclopentyl methyl ether	1-3 (1)	50-70	1-3 (1)	55	1-5 (3)
	Dimethoxymethane	1-3 (1)	25	1-3 (1)	25	1-5 (3)
	t-amyl methyl ether	1-8 (8)	50-70	1-20 (20)	50	1-5 (3)
Dipolar aprotic	Polarclean	1-3 (3)	140	1-3 (1)	140	1-5 (2)
	Agnique AMD810	1-8 (3)	140	1-20 (5)	140	1-5 (2)
Chlorinated	Chlorobenzene	1-8 (8)	60-80	1-20 (20)	100	1-5 (1)
	1,2-dichlorobenzene	1-8 (8)	100-140	1-20 (20)	140	1-5 (2)
	Chloroform	3-8 (8)	25	3-20 (20)	25	1-5 (2)

[a] Optimal values are given in parenthesis.

Table S2. Summary of the TFTs characteristics of P3HT processed from different solvents

Solvent classification	**Solvent**	**T_s(°C)**	**μ_h($cm^2V^{-1}s^{-1}$)**	**V_t(V)**	**I_{ON}/I_{OFF}**
Aromatic	p-Cymene	110	0.0080	40	1.3×10^2
Ether	Cyclopentyl methyl ether	55	0.010	-16	1.8×10^3

Ts = substrate temperature

Table S3. Summary of the TFTs characteristics of C8-BTBT processed from different solvents

Solvent classification	**Solvent**	**T_s(°C)**	**μ_h($cm^2V^{-1}s^{-1}$)**	**V_t(V)**	**I_{ON}/I_{OFF}**
Ester	Isobutyl acetate	55	0.057	-31	4.6×10^6
	Isopropyl acetate	30	0.92	-56	2.0×10^8
Carbonate	Dimethyl carbonate	55	0.031	-19	2.3×10^6
Ether	Anisole	75	0.92	-38	1.1×10^7
	t-Amyl methyl ether	45	0.73	-30	3.5×10^8

Ts = substrate temperature

Table S4. Summary of the TFTs characteristics of PTCDI-C8 processed from different solvents

Solvent classification	**Solvent**	**T_s(°C)**	**μ_h($cm^2V^{-1}s^{-1}$)**	**V_t(V)**	**I_{ON}/I_{OFF}**
Ether	Anisole	90	0.13	36	1.5×10^7
Dipolar aprotic	Steposol (N,N-dimethyl-9-decenamide)	140	0.0071	2.7	1.2×10^5

Ts = substrate temperature

Table S5. Summary of the TFTs characteristics of PDIF-CN2 processed from different solvents

Solvent classification	**Solvent**	**T_s(°C)**	**μ_e($cm^2V^{-1}s^{-1}$)**	**V_t(V)**	**I_{ON}/I_{OFF}**
Ester	Methyl laurate	140	0.000094	-52	1.3×10^2
	n-Amyl acetate	80	0.000010	-52	3.4×10^2
	Purasolv EHL	140	0.069	-32	2.3×10^3

Ts = substrate temperature