

Electronic Supplementary Information (ESI) for :

Progress in organic photovoltaics based on green-solvents: From solubility enhancement to morphology optimization

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Supplementary tables:

Table S1 summary of the advance in *o*-XY processed organic photovoltaics.

Additive	Active layer	Fabrication method	V_{oc} (V)	J_{sc} (mA cm ⁻²)	FF (%)	PCE (%)	Ref.
/	D18:Y6	Blade-coating (BHJ)	0.777	21.52	66.28	11.08	1
/	D18:N3	Blade-coating (BHJ)	0.819	22.79	72.55	13.54	1
/	D18:Y6-DT	Blade-coating (BHJ)	0.864	21.76	74.46	14.00	1
DIO	PM6:BO-4Cl	Spin-coating (BHJ)	0.838	25.80	76.05	16.45	2
DIO	PM6/BO-4Cl	Spin-coating (LBL)	0.838	26.48	76.74	17.03	2
DIO	PM6/BO-4Cl:L8-BO	Spin-coating (LBL)	0.842	27.14	78.28	17.89	2
DPS	PM6:TBFCI50-BDD:IT-4F	Spin-coating (BHJ)	0.858	20.60	72.40	12.80	3
DPE	TPD-3F:IT-4F	Spin-coating (BHJ)	0.893	19.39	67.49	11.68	4
CN/BTBT	PM6:Y6	Spin-coating (BHJ)	0.811	26.14	77.30	16.37	5
CN/DTBDT	PM6:Y6	Spin-coating (BHJ)	0.798	25.28	71.40	14.40	5
/	PL1:BTP-eC9-4F	Spin-coating (BHJ)	0.876	27.11	76.41	18.14	6
DIO	PM6:5BDTBDD:BTP-BO-4Cl	Spin-coating (BHJ)	0.840	26.80	77.40	17.50	7
DIO	PM6:5BDDBDT:BTP-BO-4Cl	Spin-coating (BHJ)	0.840	26.70	77.40	17.30	7
2-MN	PM6:PTer-N25	Spin-coating (BHJ)	0.940	19.52	65.13	11.94	8
/	PM6:BO-4Cl:Y6-1O	Hot spin-coating (BHJ)	0.851	26.75	80.00	18.25	9
2-MN	PM6:PY-DT	Spin-coating (BHJ)	0.954	23.09	77.30	17.03	10
DIO	PM6:BTP-eC9	Spin-coating (LBL)	0.840	26.65	78.10	17.48	11
/	PTQ10:Y6-BO	Aerosol printing	0.865	25.45	71.18	15.65	12
1-MN	PM6:L14	Spin-coating (BHJ)	0.950	22.10	74.10	15.62	13
/	PPDT2FBT:PC ₆₁ BM	Spin-coating (BHJ)	0.800	15.60	72.00	9.20	14
DMN	PM6:Y6	Blade-coating (BHJ)	0.834	24.95	74.55	15.51	15
AA	PPDT2FBT:PC ₆₁ BM	Spin-coating (BHJ)	0.800	15.60	72.00	9.20	14
DIO	PPDT2FBT:PC ₆₁ BM	Spin-coating (BHJ)	0.800	11.80	66.00	6.60	14
/	PM6:BTP-EHBO-4F	Spin-coating (BHJ)	0.850	26.12	75.78	16.82	16
/	PM6:BTP-PHD-4F	Spin-coating (BHJ)	0.870	25.64	71.34	15.91	16
DPE	P4T2F-HD:Y6-BO	Spin-coating (BHJ)	0.720	24.39	75.30	13.65	17
/	PM6:YSe-C6	Spin-coating (BHJ)	0.850	25.90	73.00	16.10	18
/	PM6:DTY6	Spin-coating (BHJ)	0.856	24.94	75.50	16.10	19
DIO	PBTVT:ITOIC-2F	Spin-coating (BHJ)	0.910	20.42	59.70	11.04	20
DIO	TPD-1:IT-4F	Spin-coating (BHJ)	0.810	19.40	74.70	11.70	21
DIO	TPD-2:IT-4F	Spin-coating (BHJ)	0.810	19.60	74.20	11.80	21
DIO	TPD-3:IT-4F	Spin-coating (BHJ)	0.800	20.10	75.30	12.10	21

DIO	TPD-3F:IT-4F	Spin-coating (BHJ)	0.910	20.50	73.80	13.80	21
/	PM6:Y6	Slot-Die Coating (BHJ)	0.810	26.60	70.30	15.60	22
DMF	PTB7-Th:PNDI2OD-T2	Spin-coating (BHJ)	0.780	11.40	57.00	5.07	23
DMAc	PTB7-Th:PNDI2OD-T2	Spin-coating (BHJ)	0.790	14.80	52.00	6.08	23
NMP	PTB7-Th:PNDI2OD-T2	Spin-coating (BHJ)	0.790	12.10	54.00	5.16	23
/	PM6:IT-4F	Spin-coating (LBL)	0.840	20.50	75.00	12.90	24
/	PM6:IT-4F	Blade-coating (LBL)	0.840	20.70	71.00	12.30	24

Table S2 summary of the advance in Tol processed organic photovoltaics.

Additive	Active layer	Fabrication method	V_{oc} (V)	J_{sc} (mA cm ⁻²)	FF (%)	PCE (%)	Ref.
CN	PBDB-T-b-PYT	Spin-coating (BHJ)	0.893	20.55	68.35	12.54	25
/	D18:L8-BO	Spin-coating (BHJ)	0.898	25.21	70.96	16.10	26
/	DEH-3:L8-BO	Spin-coating (BHJ)	0.907	26.01	71.13	16.80	26
/	DEH-10:L8-BO	Spin-coating (BHJ)	0.904	25.25	72.09	16.50	26
/	DEH-20:L8-BO	Spin-coating (BHJ)	0.901	26.37	70.81	16.80	26
PN	PM7/BTP-eC9	Spin-coating (LBL)	0.879	24.21	71.63	15.20	27
PN	PM7/P(SBDT-Cl):BTP-eC9	Spin-coating (LBL)	0.879	24.70	72.60	15.80	27
/	PM6-OEG5:BTP-eC9	Spin-coating (BHJ)	0.840	27.08	78.00	17.74	28
DIO	PM6:BTP-eC9	Spin-coating (BHJ)	0.846	26.69	75.60	17.07	29
DIO	PM6:BTP-eC9	Blade-coating (BHJ)	0.840	26.37	74.81	16.58	29
CN	PM6/PY-V- γ	Spin-coating (LBL)	0.906	24.50	76.40	17.00	30
CN	PM6:PY-V- γ	Spin-coating (BHJ)	0.913	24.30	73.30	16.30	30
/	PM6:BO-4Cl:Y6-1O	Hot spin-coating (BHJ)	0.848	27.17	79.00	18.12	9
DPE	PBDTT-DTffBT:PC ₇₁ BM	Spin-coating (BHJ)	0.880	15.15	67.40	9.26	31
PN	PM6:M36	Hot spin-coating (BHJ)	0.870	21.80	74.80	15.20	32
PN	PM6:M36:ITCC-M	Hot spin-coating (BHJ)	0.880	23.20	72.60	15.80	32
CN	PBDB-TF:BTIC-2Cl- γ CF3	Spin-coating (BHJ)	0.840	25.09	76.99	16.31	33
CN	PBDB-TF:BTIC-2Cl- γ CF3:PC ₇₁ ThBM	Spin-coating (BHJ)	0.850	25.76	78.10	17.12	33
PN	PBSF-D12:IT-4F	Spin-coating (BHJ)	0.920	20.50	70.80	13.40	34
DPE	PTB7-Th:EH-IDTBR:T2-OEHRH	Spin-coating (BHJ)	1.040	18.05	65.00	12.01	35
CN	PM6-Ir1.5:Y6-C2	Spin-coating (BHJ)	0.842	26.23	74.80	16.52	36
DPE	PTh37:ITIC	Spin-coating (BHJ)	0.927	17.63	66.70	10.90	37
DPE	PTh37:ITIC	Spin-coating (BHJ)	0.970	18.52	67.40	12.10	37
DPE	PET52:ITIC	Spin-coating (BHJ)	0.976	15.74	64.20	9.94	37
DPE	PHT53:ITIC	Spin-coating (BHJ)	1.010	13.69	57.40	8.05	37
BV	PM6:BTP-BO-4Cl	Delayed processing (BHJ)	0.854	26.10	77.70	17.33	38
F4-TCNQ	FTAZ:IT-M	Spin-coating (BHJ)	0.950	18.19	70.00	12.22	39

/	FTAZ:IT-M	Blade-coating (BHJ)	0.970	17.40	69.40	11.80	40
/	FTAZ:PBDB-T:IT-M	Blade-coating (BHJ)	0.950	18.10	73.60	13.20	40
DPE	PMTT56:IT-2F	Spin-coating (BHJ)	0.950	18.67	71.00	12.60	41
DPE	PEHTT:IT-2F	Spin-coating (BHJ)	0.890	18.90	64.00	10.80	41
DPE	PMOT39:IT-2F	Spin-coating (BHJ)	0.900	17.84	66.00	10.50	41
/	DOTFP-Phi:IT-4F	Spin-coating (BHJ)	0.860	17.75	70.00	10.65	42
/	DOTFP-TPD:IT-4F	Spin-coating (BHJ)	0.810	18.34	67.00	10.04	42
ODT	P1:ITIC-Th	Spin-coating (BHJ)	1.010	17.89	63.00	11.39	43
/	PTB7-Th:P1:IEICO-4F	Spin-coating (BHJ)	0.740	25.11	65.18	12.11	43
NMP	PBDTTT-EFT:PC ₇₁ BM	Blade-coating (BHJ)	0.830	17.89	74.00	11.09	44
DPE	P12:ITIC	Spin-coating (BHJ)	0.929	13.49	64.63	8.11	45
DPE	P19:ITIC	Spin-coating (BHJ)	0.938	15.68	68.03	10.01	45
DPE	P31:ITIC	Spin-coating (BHJ)	0.916	12.17	47.66	5.31	45

Table S3 Summary of the advance in others solvents processed organic photovoltaics.

Solvent	Additive	Active layer	Fabrication method	V _{oc} (V)	J _{sc} (mA cm ⁻²)	FF (%)	PCE (%)	Ref.
<i>p</i> -XY	CN	PM6:Y6:BT4O	Spin-coating (BHJ)	0.850	26.03	72.48	16.03	46
<i>p</i> -XY	CN	PM6:PM7:Y6:BTO	Spin-coating (BHJ)	0.860	27.19	76.05	17.78	46
<i>p</i> -XY	/	PM6:BO-4Cl:Y6-1O	Hot spin-coating (BHJ)	0.843	27.07	80.00	18.20	9
<i>p</i> -XY	CN	PM6:Y6:BTO	Spin-coating (BHJ)	0.850	26.32	74.32	16.59	47
<i>p</i> -XY	CN	PM6:Y6:BTO:PC ₇₁ BM	Spin-coating (BHJ)	0.850	27.12	75.15	17.41	47
THF	/	BT-2F:N3	Spin-coating (Solvent annealing)	0.838	23.86	70.68	14.13	48
THF	/	PE31:BTA5	Spin-coating (BHJ)	1.110	13.68	66.40	10.08	49
THF	/	PE32:BTA5	Spin-coating (BHJ)	1.100	11.65	57.73	7.40	49
THF	/	PE33:BTA5	Spin-coating (BHJ)	1.160	12.68	61.13	8.99	49
THF	/	J52-Cl:BTA5	Spin-coating (BHJ)	1.210	11.36	62.86	8.64	49
THF	/	PTQ10:HO-IDIC-2F	Spin-coating (LBL)	0.905	18.11	73.40	12.03	50
THF	/	PTQ10:HO-IDIC-2F	Blade-coating (LBL)	0.892	18.79	70.69	11.85	50
THF	DIO	PBDB-TF:BTP-4F-12	Spin-coating (BHJ)	0.853	25.20	75.00	16.10	51
2-MeTHF	/	PTzBI-Si:PRiC39	Spin-coating (BHJ)	0.900	23.10	69.40	14.40	52
2-MeTHF	/	PTzBI-Si:PRoC39	Spin-coating (BHJ)	0.830	22.10	73.20	13.40	52
MeTHF	/	PTB-EDOT:ITIC-Th	Spin-coating (BHJ)	0.840	15.37	66.50	8.59	53
MeTHF	/	PTB-EDOTS:ITIC-Th	Spin-coating (BHJ)	0.880	16.25	71.20	10.18	53
TMB	/	PM6:IT-M/BTP-eC9	Blade-coating (LBL)	0.855	26.34	76.20	17.16	54
TMB	/	PBTz-TC:IT-4F	Spin-coating (BHJ)	0.840	20.61	71.76	12.42	55
TMB	/	PBTz-TC/IT-4F	Spin-coating (LBL)	0.840	20.91	72.69	12.81	55
TMB	CN	PMT50:Y6-BO	Spin-coating (BHJ)	0.842	26.10	67.70	15.30	37
TMB	DMN	PTB7-Th:F-NPDI2	Spin-coating (BHJ)	1.100	6.90	33.00	2.50	56
TMB	/	PM6:Y6	Slot-Die Coating (BHJ)	0.800	26.40	70.90	15.40	22
1,2,4-TMB	1-MN	PM6:L14	Spin-coating (BHJ)	0.950	20.97	69.53	13.84	13
	CS ₂	PM6:L14	Spin-coating (BHJ)	0.950	21.09	65.17	13.03	13
	CS ₂	BT-2F:N3	Spin-coating (Solvent annealing)	0.845	24.28	75.02	15.39	48
<i>o</i> -XY:TMB	DIO	PTzBI-dF:CH1007	Spin-coating (BHJ)	0.820	28.15	77.80	18.00	57
<i>o</i> -XY:CS ₂	/	PM6:Y6	Spin-coating (BHJ)	0.840	25.60	76.80	16.50	58
<i>o</i> -XY/THF	DIO	PM6/ BO-4F	Spin-coating (LBL)	0.820	26.20	74.30	16.00	59
MA:DPE	/	PTB7-Th:ITIC	Spin-coating (BHJ)	0.760	11.61	51.00	4.52	60
THF:NMP	/	T1:IT-4F	Spin-coating (BHJ)	0.887	21.10	76.00	14.20	61

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