Electronic Supplementary information (ESI)

An isoindigo containing donor-acceptor polymer: synthesis and photovoltaic property from all-solution-based ITO- and vacuum-free large area roll-coated single junction and tandem solar cells

Rasmus Guldbaek Brandt[a,b,†], Wei Yue [a,†], Thomas Rieks Andersen[c], ThueTrofod Larsen-Olsen[c], Mogens Hinge[d], Eva Bundgaard[c], Frederik C. Krebs[c], Donghong Yu [a,*]

[a] Department of Chemistry and Bioscience, Aalborg University, Fredrik Bajers Vej 7H, DK-9220, Aalborg East, Denmark
[b]Sino-Danish Centre for Education and Research (SDC), Niels Jenses Vej 2, DK-8000, Aarhus, Denmark
[c] Department of Energy Conversion and Storage, Technical University of Denmark, Frederiksborgvej 399, DK-4000, Roskilde, Denmark
[d]Department of Engineering, Aarhus University, Hangoevej 2, 8200 Aarhus N, Denmark
* Corresponding authors: yu@bio.aau.dk
†Equal contributions to this work

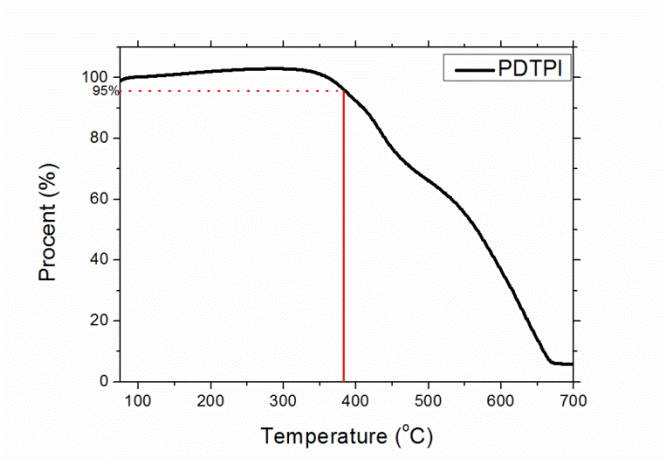


Figure S1. Thermal gravimetric Analysis of PDTPI, scanned with a heating rate 10 $^{o}C\ s^{-1}$ under a nitrogen atmosphere.

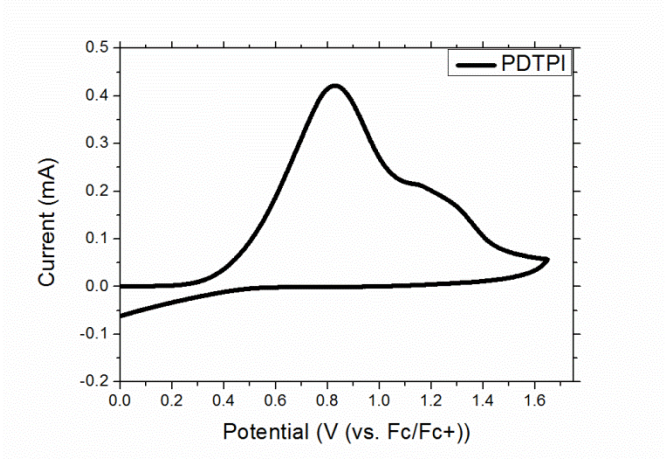
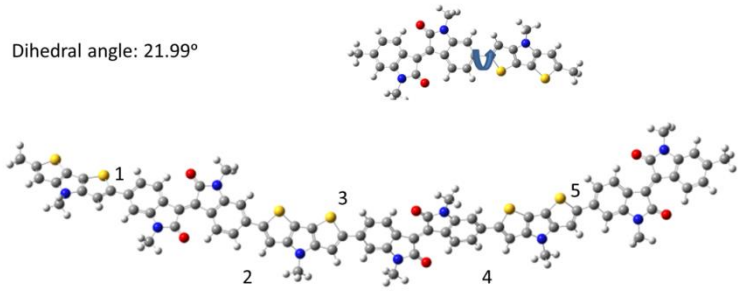


Figure S2. Cyclic voltammetry of PDTPI



Linkage no.	Angle
1	20.87
2	20.46
3	20.88
4	-19.88
5	-20.45

Figure S3. Molecular Modelling – dihedral angles of PDTPI

Table S1. The generic layer thickness of the respectively roll-coated devices, YYY denotes the layer compositions explained in the writing, and XXX denotes the layer thickness specified in the writing.

Layer	Material	Dry thickness (nm)
Substrate: Flextrode ([1], [2])	PET/Ag-comb/PEDOT:PSS/ZnO	
Active layer	YYY	XXX
Wetting layer	PEDOT:PSS F010:IPA (1:4)	25
Hole transport layer	PEDOT:PSS 4083:IPA (1:2)	75
Conducting layer	PEDOT:PSS F010:IPA (1:1)	288

PEDOT:IPA solution is denoted in vol/vol

Table S2. Active layer structure and thickness

Layer	Material	Dry thickness (nm)
Substrate: Flextrode ([1], [2])	PET/Ag-comb/PEDOT:PSS/ZnO	
Active layer 1	P3HT:PCBM (1:1)	180
Wetting layer	PEDOT:PSS F010:IPA (1:4)	25
Hole transport layer	PEDOT:PSS 4083:IPA (1:2)	75
Electron transport layer	ZnO	63
Active layer 2	PDTPI:PCBM 1:2 in CB	270
Wetting layer	PEDOT:PSS F010:IPA (1:4)	25
Hole transport layer	PEDOT:PSS 4083:IPA (1:2)	75
Conducting layer	PEDOT:PSS F010:IPA (1:1)	288

PEDOT:IPA solution is denoted in vol/vol

[1] T. R. Andersen, H. F. Dam, B. Andreasen, M. Hösel, M. V. Madsen, S. a. Gevorgyan, R. R. Søndergaard, M. Jørgensen, and F. C. Krebs, "A rational method for developing and testing stable flexible indium- and vacuum-free multilayer tandem polymer solar cells comprising up to twelve roll processed layers," *Sol. Energy Mater. Sol. Cells*, vol. 120, pp. 735–743, Jan. 2014.

[2] D. Angmo, S. a. Gevorgyan, T. T. Larsen-Olsen, R. R. Søndergaard, M. Hösel, M. Jørgensen, R. Gupta, G. U. Kulkarni, and F. C. Krebs, "Scalability and stability of very thin, roll-to-roll processed, large area, indium-tin-oxide free polymer solar cell modules," *Org. Electron.*, vol. 14, no. 3, pp. 984–994, Mar. 2013.