

SUPPORTING INFORMATION

Photochemical stability and Photovoltaic Performance of Low-Bandgap polymers based on Dithiophene with Different Bridging Atoms

Martin Helgesen,^{*,a} Thomas J. Sørensen,^b Matthieu Manceau^a and Frederik C. Krebs^a

^a *Risø National Laboratory for Sustainable Energy, Technical University of Denmark, Frederiksborgvej 399, DK-4000 Roskilde, Denmark.*

^b *Nano-Science Center and Department of Chemistry, University of Copenhagen, Universitetsparken 5, DK-2100 København Ø, Denmark*

E-mail: manp@risoe.dtu.dk

Table of Contents:

General experimental details	S2
AFM topography images of the polymer:PCBM solar cells	S3
¹ H-NMR spectra of the polymers	S4-S5

General experimental details

General methods, instrumentation and materials. Molecular weights were determined using size exclusion chromatography in HPLC-grade chloroform against polystyrene standards on a KNAUER chromatograph with a refractive index detector and a diode array UV-vis detector. UV-vis absorption spectra were measured with a Perkin-Elmer Lambda 900 spectrometer. AFM images were taken on a Nanos multimode AFM (Bruker). Unless stated otherwise all reagents and solvents were obtained from Aldrich and used without further purification. Dichloromethane, THF and toluene were dried with molecular sieves (3 Å) and used directly without filtration or distillation. NBS was recrystallized from water and dried at 70 °C in vacuum. Evaporation was performed on a rotary evaporator at 40 °C. NMR spectra were obtained on a Bruker 250 MHz spectrometer. 4,7-bis(5-bromothiophen-2-yl)-5,6-bis(tetradecyloxy)benzo[c][1,2,5]thiadiazole,¹ 4,7-bis(5-bromo-4-dodecylthiophen-2-yl)benzo[c][1,2,5]thia-diazole,² (4,4-bis(2-ethylhexyl)-4H-cyclopenta[1,2-b:5,4-b']dithiophene-2,6-diyl)-bis(trimethylstannane)³ and 4,4-dihexyl-2,6-bis(trimethylstannyl)-4H-silolo[3,2-b:4,5-b']dithiophene⁴ were prepared according to literature procedures or slight modifications thereof.

¹ Helgesen, M.; Gevorgyan, S. A.; Krebs, F. C.; Janssen, R. A. *J. Chem. Mater.* **2009**, 21 (19), 4669-4675.

² Zhou, H.; Yang, L.; Xiao, S.; Liu, S.; You, W. *Macromolecules* **2010**, 43, 811–820

³ Helgesen, M.; Krebs, F. C. *Macromolecules* **2010**, 43, 1253-1260

⁴ Usta, H.; Lu, G.; Facchetti, A.; Marks, T. J. *J. Am. Chem. Soc.* **2006**, 128, 9034-9035

Atomic force microscopy (AFM)

Figure S1. AFM topography images ($2\ \mu\text{m} \times 2\ \mu\text{m}$) of solar cells based on blends of PCBM and (a) **PCPDT-DBT1**, $S_q = 0.86\ \text{nm}$ (b) **PCPDT-DBT2**, $S_q = 0.59\ \text{nm}$ (c) **PSDT-DBT1**, $S_q = 1.13\ \text{nm}$ (d) **PSDT-DBT2**, $S_q = 0.35\ \text{nm}$.

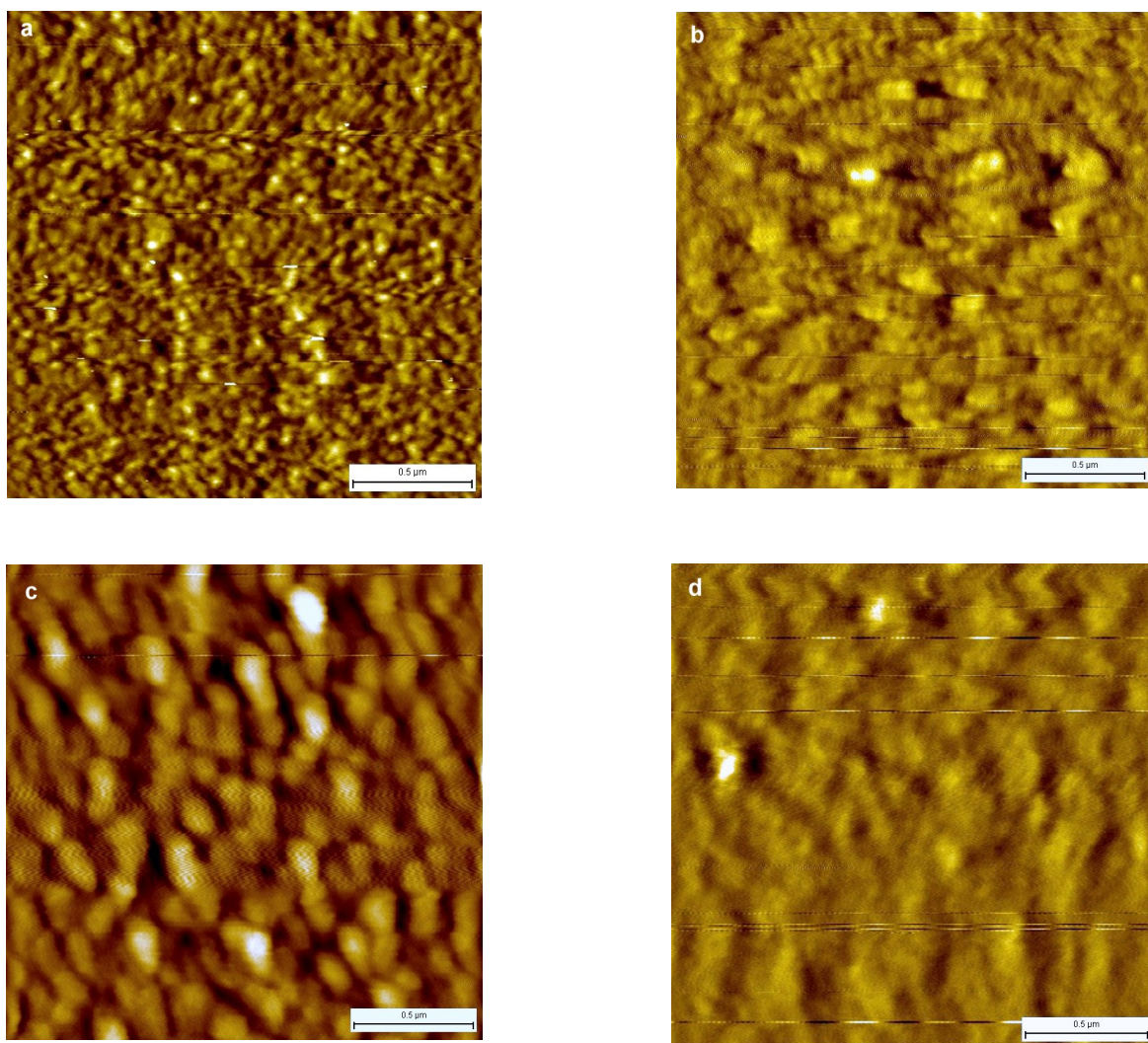


Figure S2. ^1H -NMR Spectrum of **PCPDT-DBT1** in CDCl_3

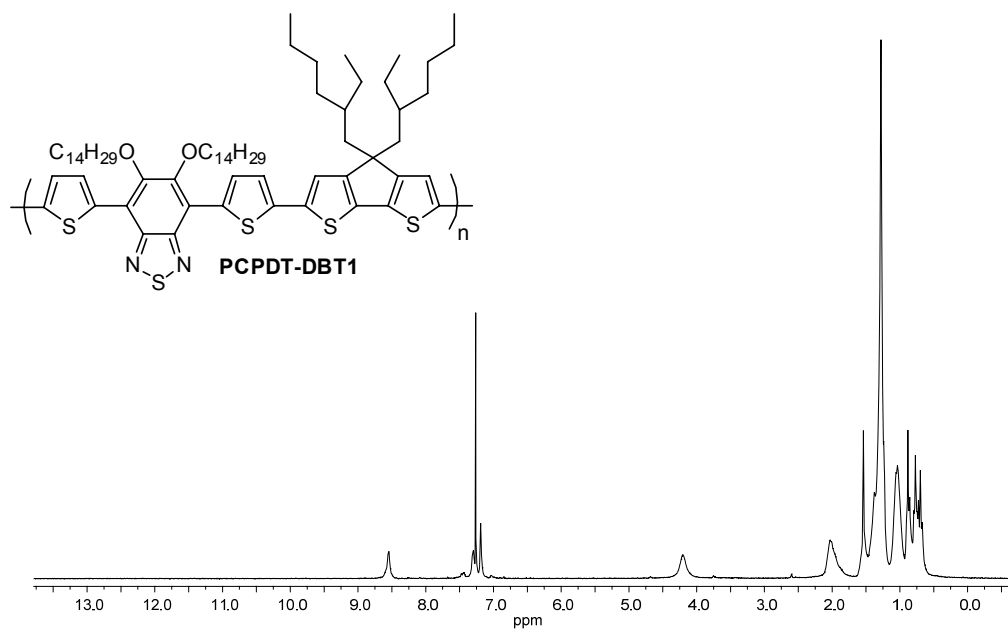


Figure S3. ^1H -NMR Spectrum of **PCPDT-DBT2** in CDCl_3

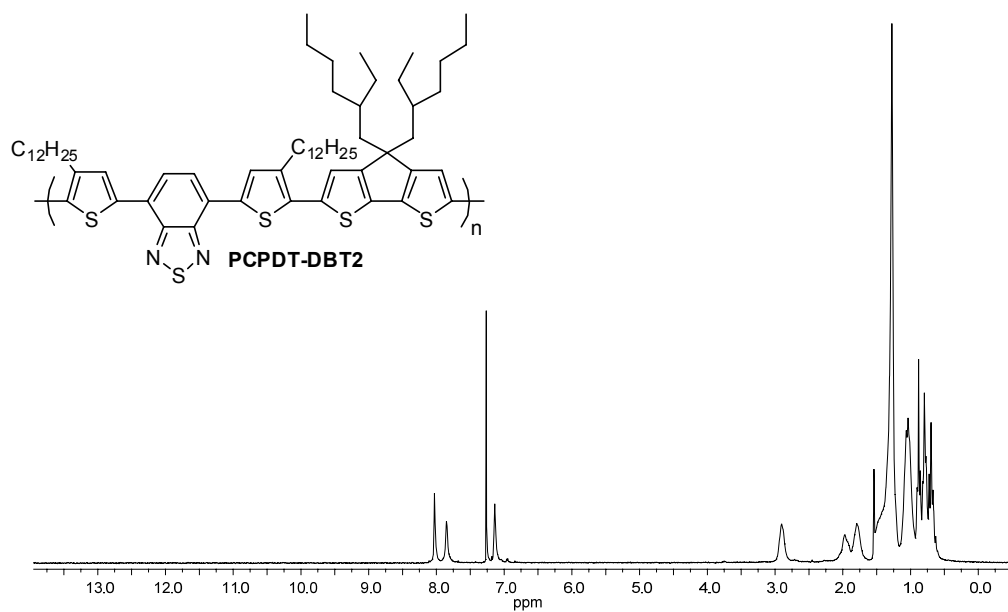


Figure S4. ^1H -NMR Spectrum of **PSDT-DBT1** in CDCl_3

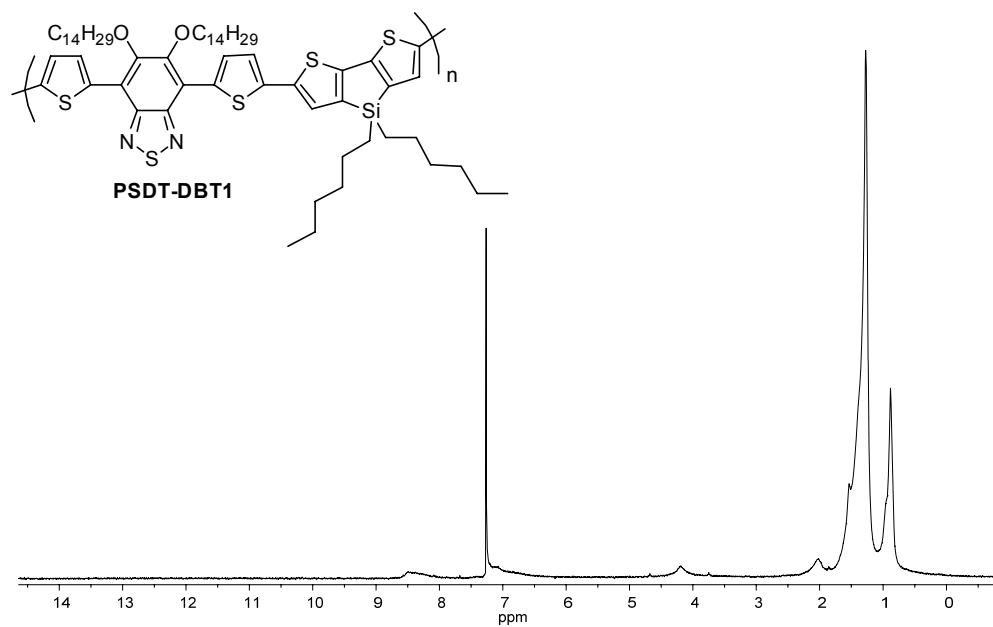


Figure S5. ^1H -NMR Spectrum of **PSDT-DBT2** in CDCl_3

