Chain Length Dependence of the Photovoltaic Properties of Monodisperse Donor-Acceptor Oligomers as Model Compounds of Polydisperse Low Band Gap Polymers

Titre	Chain Length Dependence of the Photovoltaic Properties of Monodisperse Donor-Acceptor Oligomers as Model Compounds of Polydisperse Low Band Gap Polymers
Type de publication	Article de revue
Auteur	Zhou, Cheng [1], Liang, Yamin [2], Liu, Feng [3], Sun, Chen [4], Huang, Xuelong [5], Xie, Zengqi [6], Huang, Fei [7], Roncali, Jean [8], Russell, Thomas P. [9], Cao, Yong [10]
Editeur	Wiley-VCH Verlag
Type	Article scientifique dans une revue à comité de lecture
Année	2014
Date	Jan-09-2014
Numéro	47
Pagination	7538-7547
Volume	24
Titre de la revue	Advanced Functional Materials
ISSN	1616-301X
Mots-clés	conjugated oligomers [11], D-A structure [12], Morphology [13], Organic photovoltaics [14], repeat units [15]
Résumé en anglais	Well-defined conjugated oligomers (Sn) containing from 1 to 8 units of a tricyclic building block involving a dioctyloxybenzothiadiazole unit with two thienyl side rings (S1) are synthesized by a bottom-up approach. UV–Vis absorption data of solutions show that chain extension produces a narrowing of the HOMO–LUMO gap (ΔE) to values slightly smaller than that of the parent polymer (P1). Plots of ΔE and of the band gap of films (E g) versus the reciprocal chain length show that ΔE and E g converge towards a limit corresponding to an effective conjugation length (ECL) of 7–8 S1 units. UV–Vis absorption and photoluminescence data of solutions and solid films show that chain extension enhances the propensity to inter-chain aggregation. This conclusion is confirmed by GIXD analyses which reveal that the edge-on orientation of short-chain systems evolves toward a face-on orientation as chain length increases while the π-stacking distance decreases beyond 7 units. The results obtained on solution-processed BHJ solar cells show a progressive improvement of power conversion efficiency (PCE) with chain extension; however, the convergence limit of PCE remains inferior to that obtained with the polymer. These results are discussed with regard to the role of mono/polydispersity and chain aggregation.
URL de la notice	http://okina.univ-angers.fr/publications/ua5473 [16]
DOI	10.1002/adfm.201401945 [17]
Titre abrégé	Adv. Funct. Mater.

Liens
[1] http://okina.univ-angers.fr/publications?f[author]=9191
[2] http://okina.univ-angers.fr/publications?f[author]=9192
[3] http://okina.univ-angers.fr/publications?f[author]=9193
[4] http://okina.univ-angers.fr/publications?f[author]=9194
[5] http://okina.univ-angers.fr/publications?f[author]=9195
[6] http://okina.univ-angers.fr/publications?f[author]=9196
[7] http://okina.univ-angers.fr/publications?f[author]=9197
[8] http://okina.univ-angers.fr/jean.roncali/publications
[9] http://okina.univ-angers.fr/publications?f[author]=9198
[10] http://okina.univ-angers.fr/publications?f[author]=2810
[11] http://okina.univ-angers.fr/publications?f[keyword]=5156
[12] http://okina.univ-angers.fr/publications?f[keyword]=10128
[13] http://okina.univ-angers.fr/publications?f[keyword]=4885
[14] http://okina.univ-angers.fr/publications?f[keyword]=5630
[15] http://okina.univ-angers.fr/publications?f[keyword]=10129
[16] http://okina.univ-angers.fr/publications/ua5473
[17] http://dx.doi.org/10.1002/adfm.201401945