Structure-properties relationships in triarylamine-based donor-acceptor molecules containing naphtyl groups as donor material for organic solar cells

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Résumé en anglais	The effects of replacing the phenyl rings of triphenylamine (TPA) by naphtyl groups are analysed on a series of push-pull molecules containing a 2-thienyl-dicyanovinyl acceptor group. UV-Vis absorption spectroscopy and cyclic voltammetry show that the introduction of one or two naphtyl groups in the structure has limited effects on the optical properties and energy levels of the molecule. On the other hand, the evaluation of the compounds as donor material in bi-layer solar cells with C60 as acceptor shows that the number and mode of linkage of the naphtyl groups exert a marked influence on the power conversion efficiency (PCE) of the cell. Two naphtyl groups lead to a decrease of PCE with respect to TPA, while a single naphtyl group produces opposite effects depending on the linking mode. Compared to TPA, an alpha-naphtyl group leads to a small decrease of PCE while in contrast a beta-naphtyl leads to a ~35% increase of PCE due to improved short-circuit current density (Jsc) and fill-factor. The determination of the hole-mobility of these two donors by the space-charge-limited current method shows that these effects are correlated with the higher hole-mobility of the β-naphtyl compound.
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