Organic Photovoltaic Greenhouses: A Unique Application for Semi-transparent PV?

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Supplementary Information

SI.1 – Optical Data

The following figures show the refractive indices and extinction coefficients used in the optical modelling of all materials studied across the wavelength range from 300 nm to 1200 nm. Where unavailable, the refractive indices and extinction coefficients of blends were calculated based on the pristine materials using Bruggeman's model.(Bruggeman, 1935; Choy, 1999)

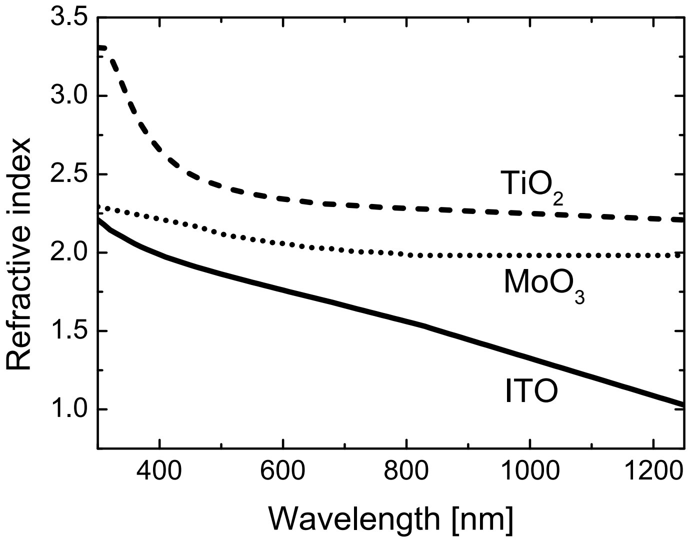

Figure SI.1.1 - Refractive index of contact materials: ITO; TiO2; and MoO3.

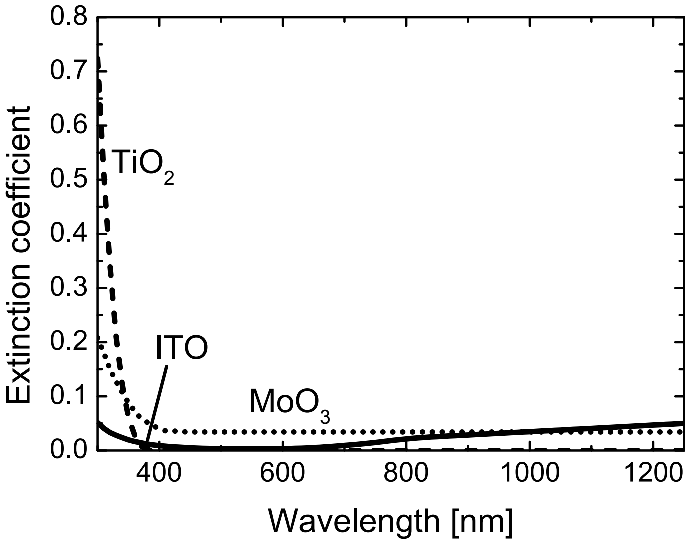

Figure SI.1.2 - Extinction coefficient of contact materials: ITO; TiO2; and MoO3.

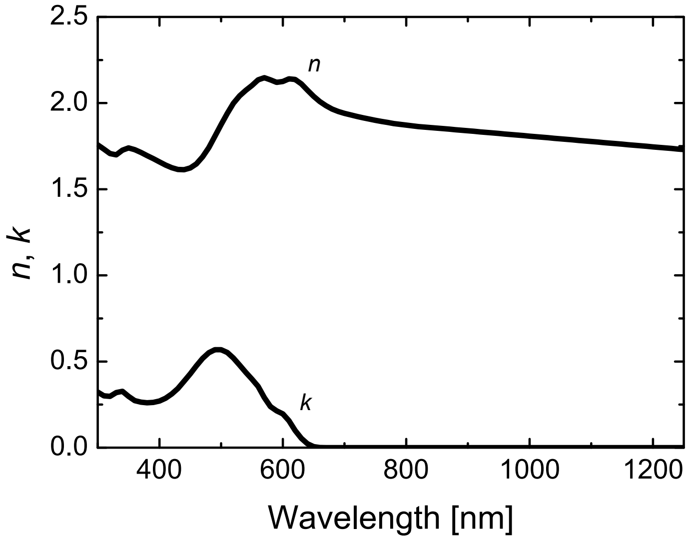

Figure SI.1.3 - Refractive index and extinction coefficient for P3HT:PC_{60}BM (blend ratio 1:1)(Campoy-Quiles, Nelson, Bradley, & Etchegoin, 2007).

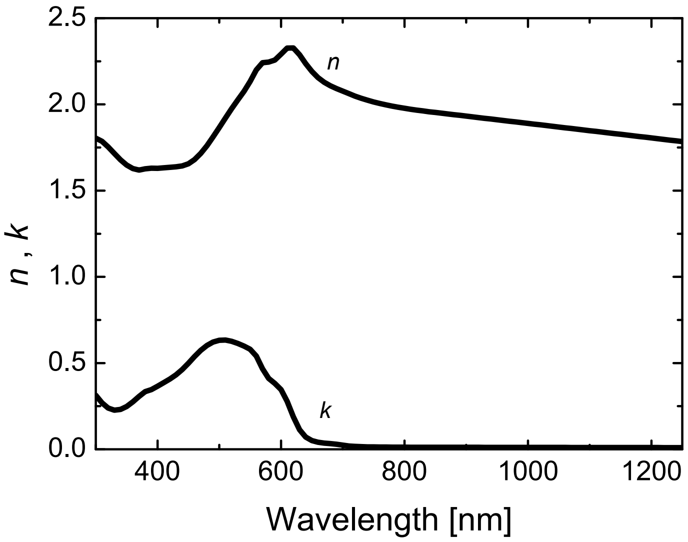

Figure SI.1.4 - Refractive index and extinction coefficient for P3HT:$PC_{70}BM$ (blend ratio 1:1). (Campoy-Quiles et al., 2007; Guerrero et al., 2013)

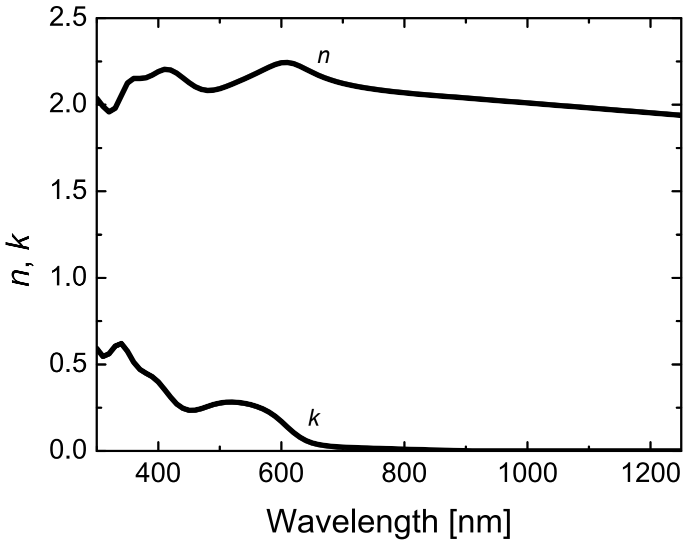

Figure SI.1.5 - Refractive index and extinction coefficient for PCDTBT:$PC_{60}BM$ (blend ratio 1:4). (Campoy-Quiles et al., 2007)

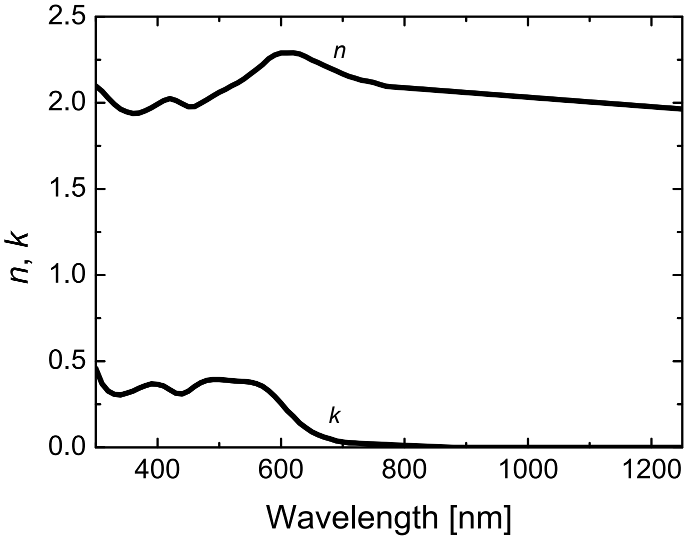

Figure SI.1.6 - Refractive index and extinction coefficient for PCDTBT:$PC_{70}BM$ (1:4).(Guerrero et al., 2013)

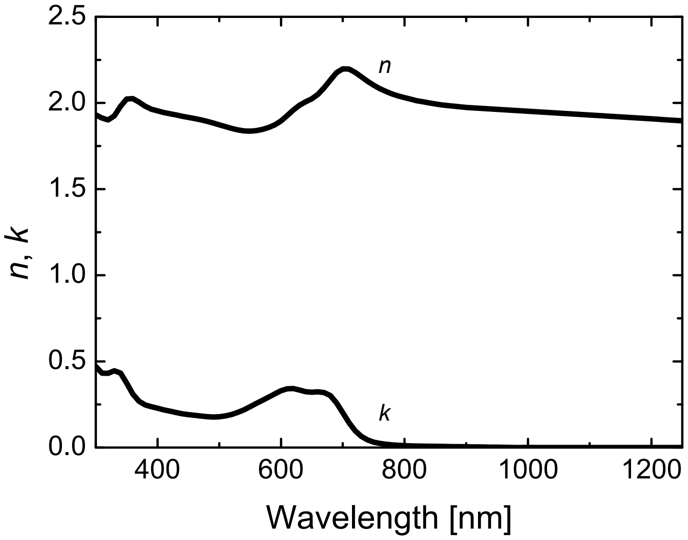

Figure SI.1.7 - Refractive index and extinction coefficient for PTB7:$PC_{60}BM$ (blend ratio 1:1.5). (Campoy-Quiles et al., 2007; Hammond et al., 2011)

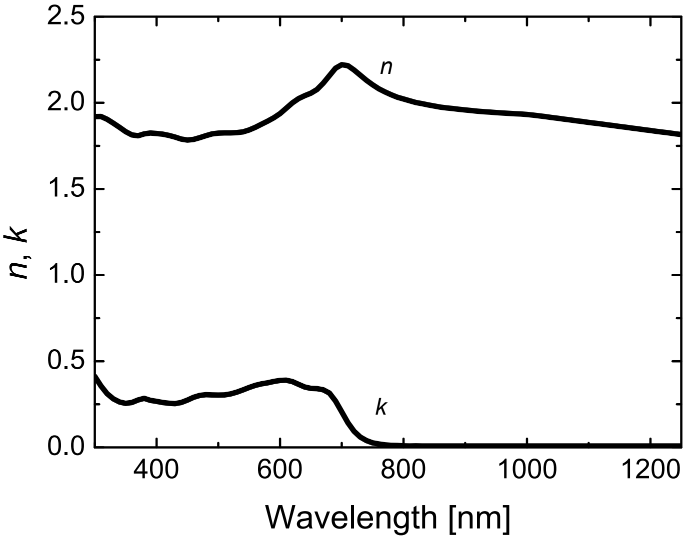

Figure SI.1.8 - Refractive index and extinction coefficient for PTB7:$PC_{70}BM$ (blend ratio 1:1.5).(Guerrero et al., 2013; Hammond et al., 2011)

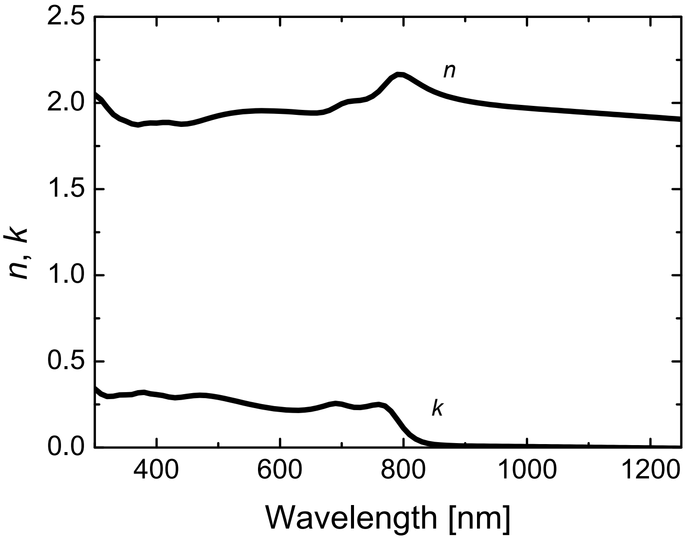

Figure SI.1.9 - Refractive index and extinction coefficient for Si-PCPDTBT:$PC_{60}BM$ (blend ratio 1:1.5)(Campoy-Quiles et al., 2007; Kirchartz, Agostinelli, Campoy-quiles, Gong, & Nelson, 2012).

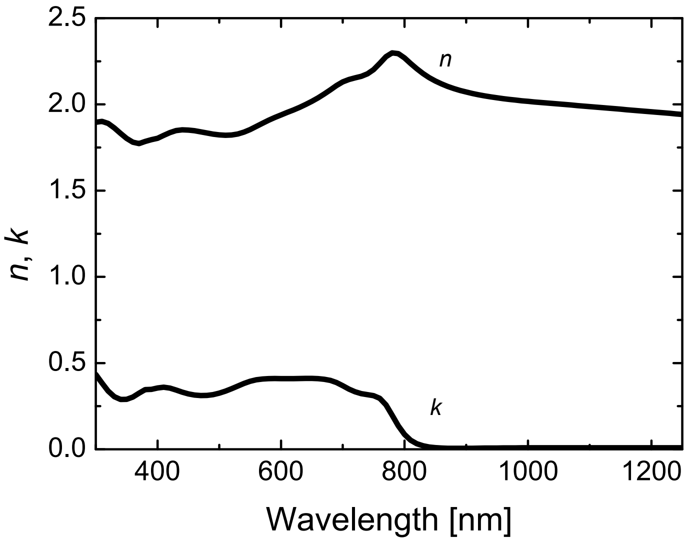

Figure SI.1.10 - Refractive index and extinction coefficient for Si-PCPDTBT:$PC_{70}BM$ (blend ratio 1:1.5).(Guerrero et al., 2013; Kirchartz et al., 2012)

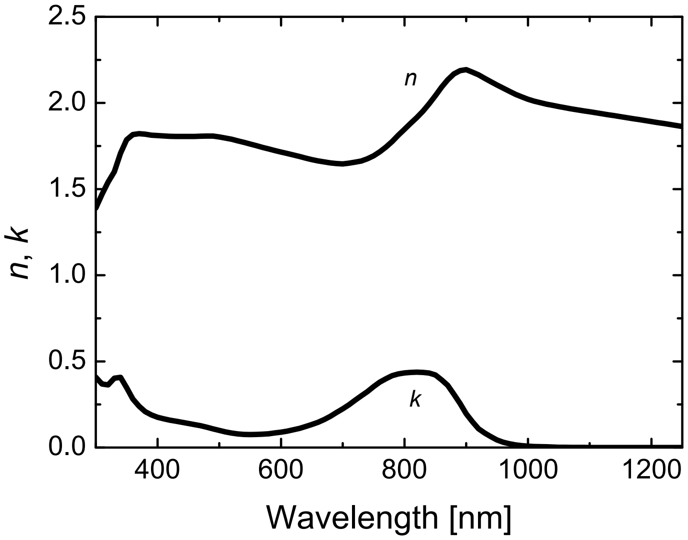

Figure SI.1.11 - Refractive index and extinction coefficient for PMDPP3T:$PC_{60}BM$ (blend ratio 1:3)(Bijleveld et al., 2009; Li, Furlan, Hendriks, Wienk, & Janssen, 2013).

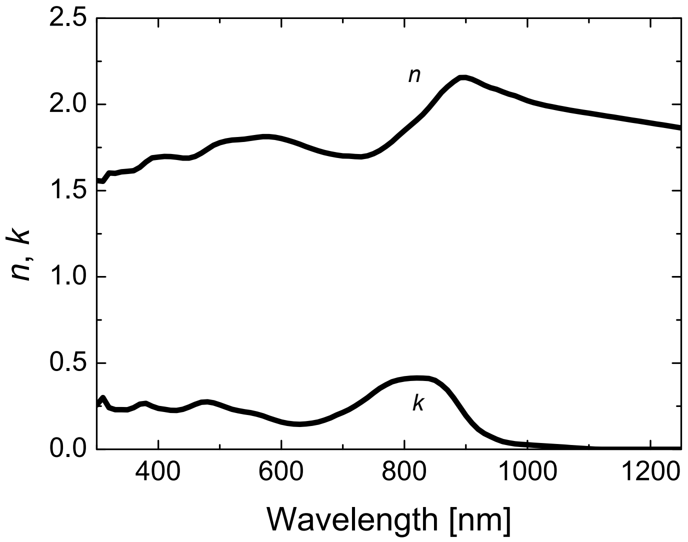

Figure SI.1.12 - Refractive index and extinction coefficient for PMDPP3T:$PC_{70}BM$ (blend ratio 1:3)(Bijleveld et al., 2009; Li et al., 2013).

SI.2 – Economic Modelling Data

SI.2.1 Balance of system costs

Table SI.2.1.1 – Balance of system costs used in economic modelling, based on those in (Azzopardi et al., 2011)

Item	Cost (€)
Avoided cost of PET sheeting	0.98 per m^2
Inverter	254.50 per kWp
Other electronics	30 per kWp
Labour for installing electronics	19.85 per kWp
Design, Project Management, Insurance, etc…	59.55 per kWp
Wiring	50 per kWp
Maintenance	2% of total system cost per year

SI.2.2 Net Present Value

The Net Present Value is calculated using equation SI.2.2.1 (Needles, Powers, & Crosson, 2011), where *C* is the cash-flow (income minus investment) at each time period (in this case, each year) *T* is the time period over which the investment is being analysed and *r* is the discount rate (this is the rate of return of an investment in a financial market with a similar level of risk, and can be understood as the opportunity cost of the investment).

$$NPV = \sum_{t=0}^{t=T} \frac{C}{(1+r)^t} \quad \text{(SI.2.2.1)}$$

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