

Electronic Supplementary Information (ESI)

Luminescent Solar Concentrators for Building Integrated Photovoltaics: Opportunities and Challenges

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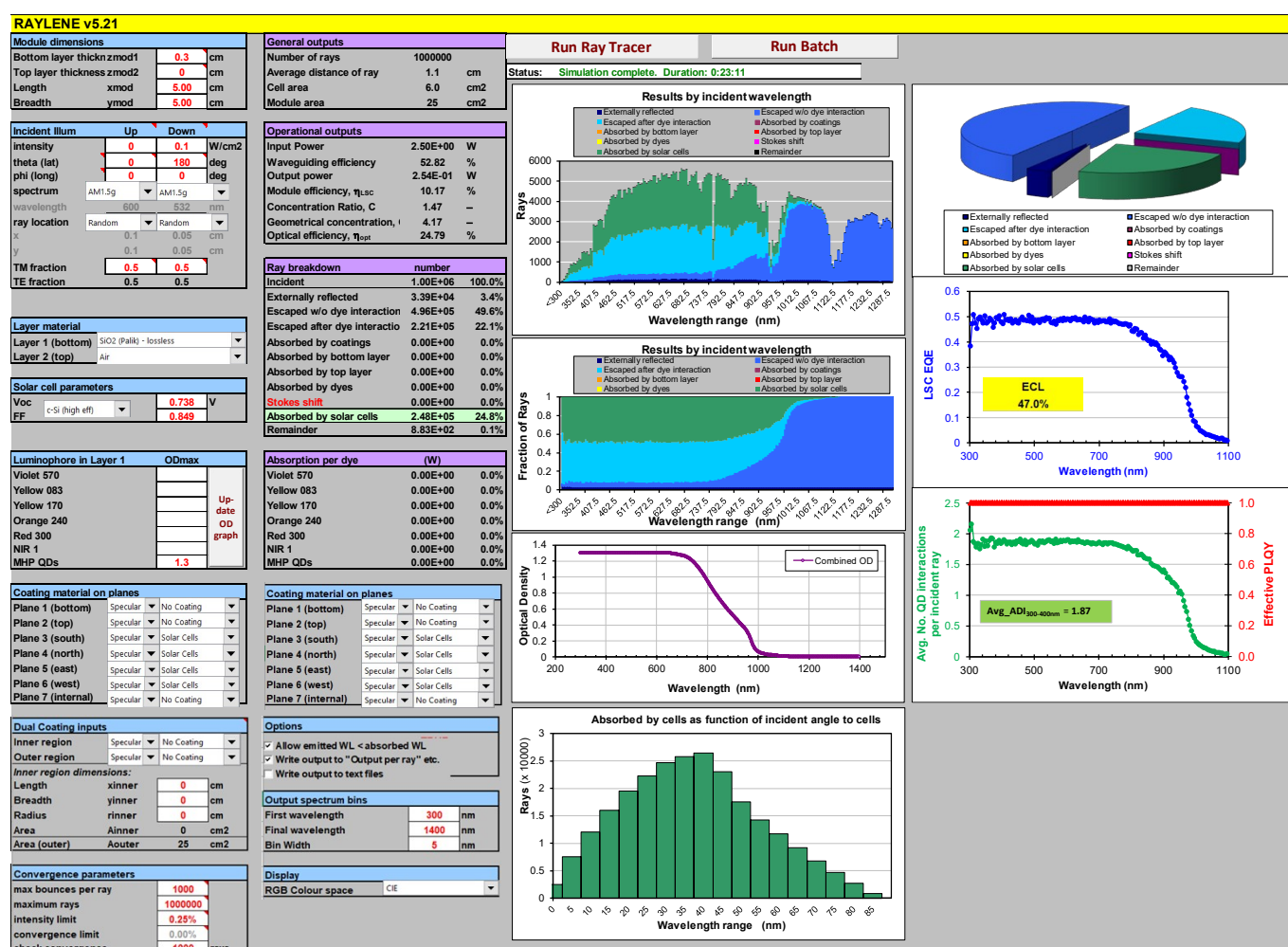


Figure S1. A screen-shot of the main page of the Raylene v5.21 interface, which is programmed in Visual Basic and runs under Microsoft Excel – designed for flexibility, not speed (1 million rays in ~23 min for the chosen input parameters). In the first two columns the inputs are given in blue and the outputs (numerical) in purple, while the graphical outputs are plotted on the right-hand side.

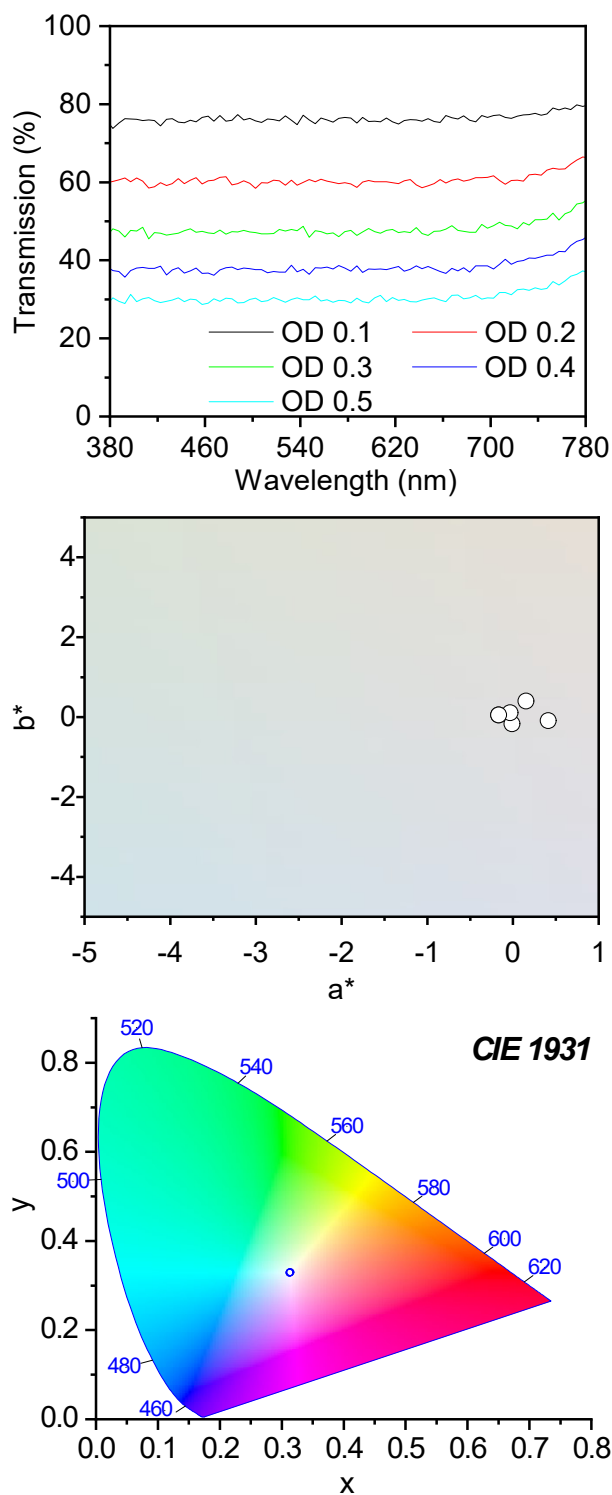


Figure S2. Results from the five semi-transparent LSCs in **Table 2** (OD = 0.1 – 0.5): (top) Fraction of visible light transmitted; (middle) colour fidelity as defined by the CRI $L^*a^*b^*$ space model and (bottom) colour purity determined using CIE1931 (with D65 standard illuminant).

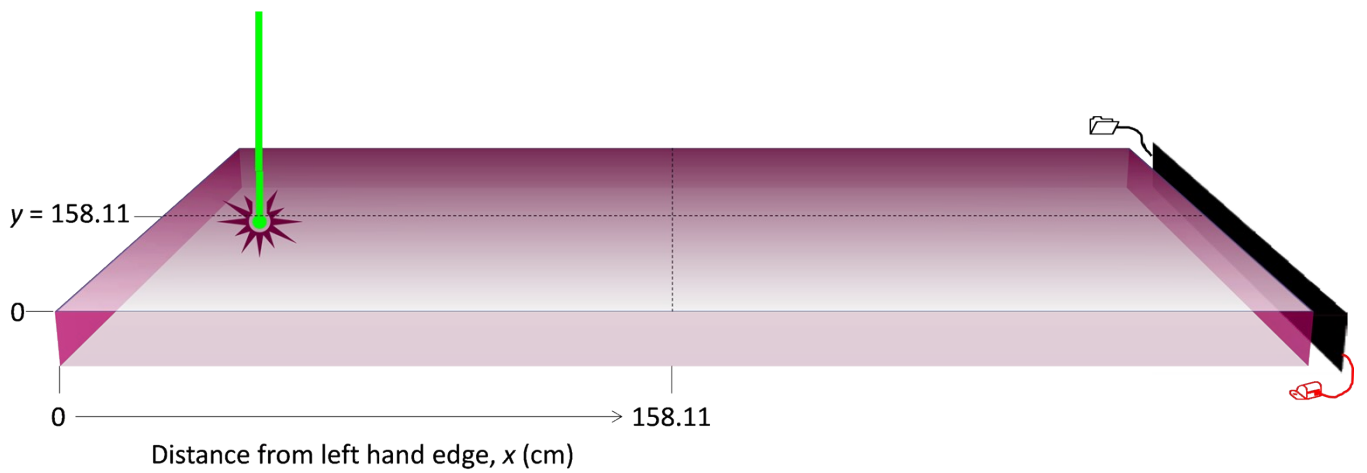


Figure S3. Schematic of simulated LBIC experiment showing a normally incident laser beam (532nm) striking the top surface of a commercial-scale (10m^2) LSC at fixed distance $y = 158.11$ cm and a variable distance x ranging from $x = 10^{-7}$ cm up to $y = 158.11$ cm (centre of the LSC). The emitted photons are collected by four c-Si solar cells mounted along the edges (only one is shown for clarity, and no air gap is present).

Table S1 The effect of absorption tails in the luminescence species (0 – 0.05 OD, as illustrated in **Figure 9a**) and its performance impact on LSCs of area 25 cm², 1000 cm² and 100000 cm² (Simulation parameters: 0.3 cm thickness, OD 1.3, 1000 nm peak emission, $OI^* = 0.0019$, 100% PLQY, c-Si solar cells attached to all four side, 1 million rays).

Abs. Tail OD (–)	η_{Lsc} (%)	ECL (%)	η_{opt} (%)	η_{wave} (%)	Conc. (–)
<i>Lab-scale (25 cm²)</i>					
0	11.8	34	28.5	65.5	1.70
+0.005	11.6	36	27.9	63.7	1.67
+0.01	11.2	38	27.2	61.7	1.62
+0.02	10.6	42	25.7	57.8	1.54
+0.03	10.1	46	24.3	54.2	1.45
+0.04	9.6	49	23.1	51.0	1.38
+0.05	9.0	52	21.8	47.7	1.31
<i>Pilot-scale (1000 cm²)</i>					
0	6.6	63	16.1	36.8	6.01
+0.005	5.44	70	13.3	30.3	4.98
+0.01	4.6	74	11.2	25.5	4.22
+0.02	3.5	81	8.5	19.2	3.23
+0.03	2.9	84	7.1	15.8	2.68
+0.04	2.5	86	6.1	13.3	2.29
+0.05	2.2	88	5.3	11.6	2.01
<i>Commercial-scale (100000 cm²)</i>					
0	1.0	94	2.5	5.8	9.07
+0.005	0.7	96	1.6	3.8	6.10
+0.01	0.5	97	1.3	3.0	4.93
+0.02	0.4	98	1.0	2.1	3.58
+0.03	0.3	98	0.8	1.7	2.89
+0.04	0.3	98	0.6	1.4	2.40
+0.05	0.2	99	0.6	1.2	2.09

