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Star-shaped fluorene-BODIPY oligomers: versatile donor-acceptor systems for luminescent solar concentrators

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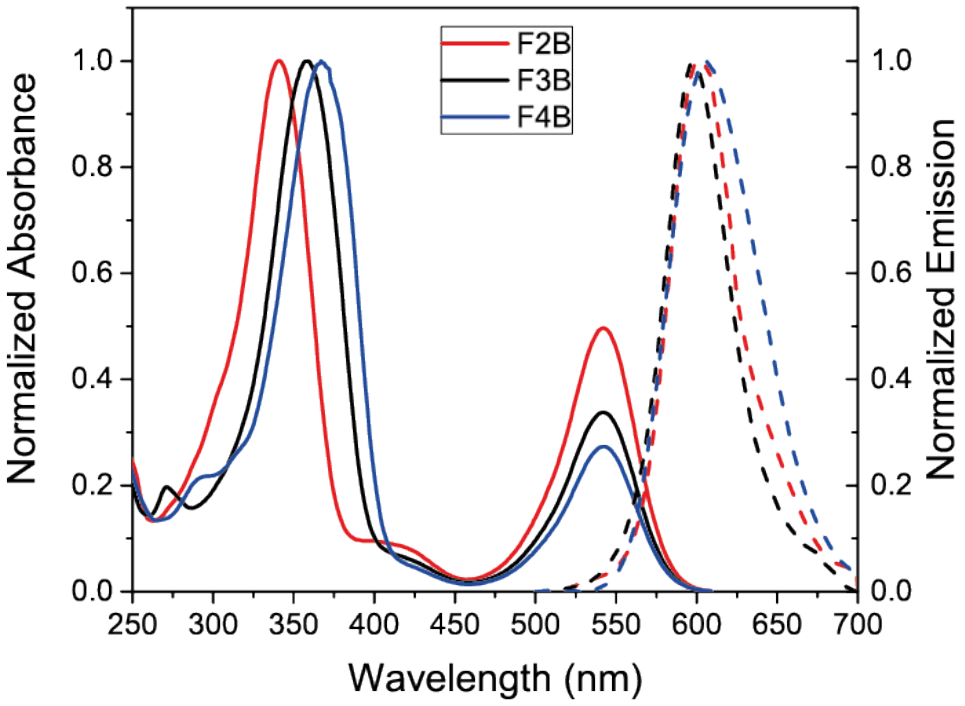
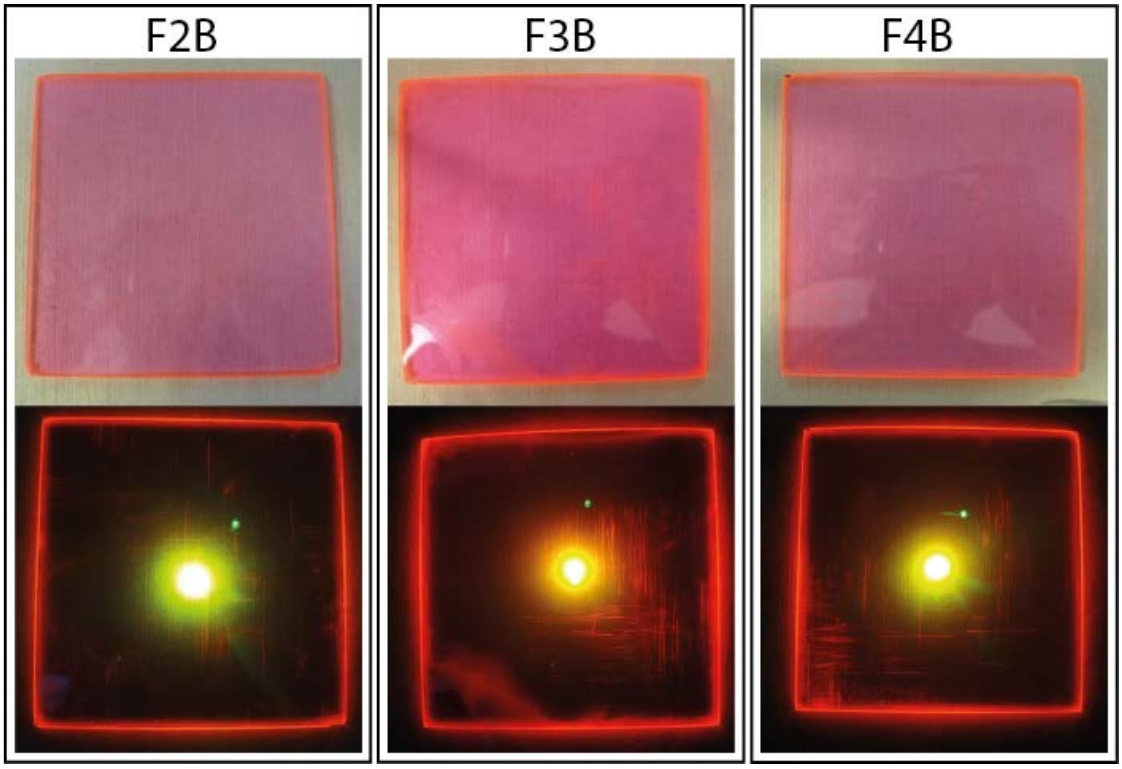
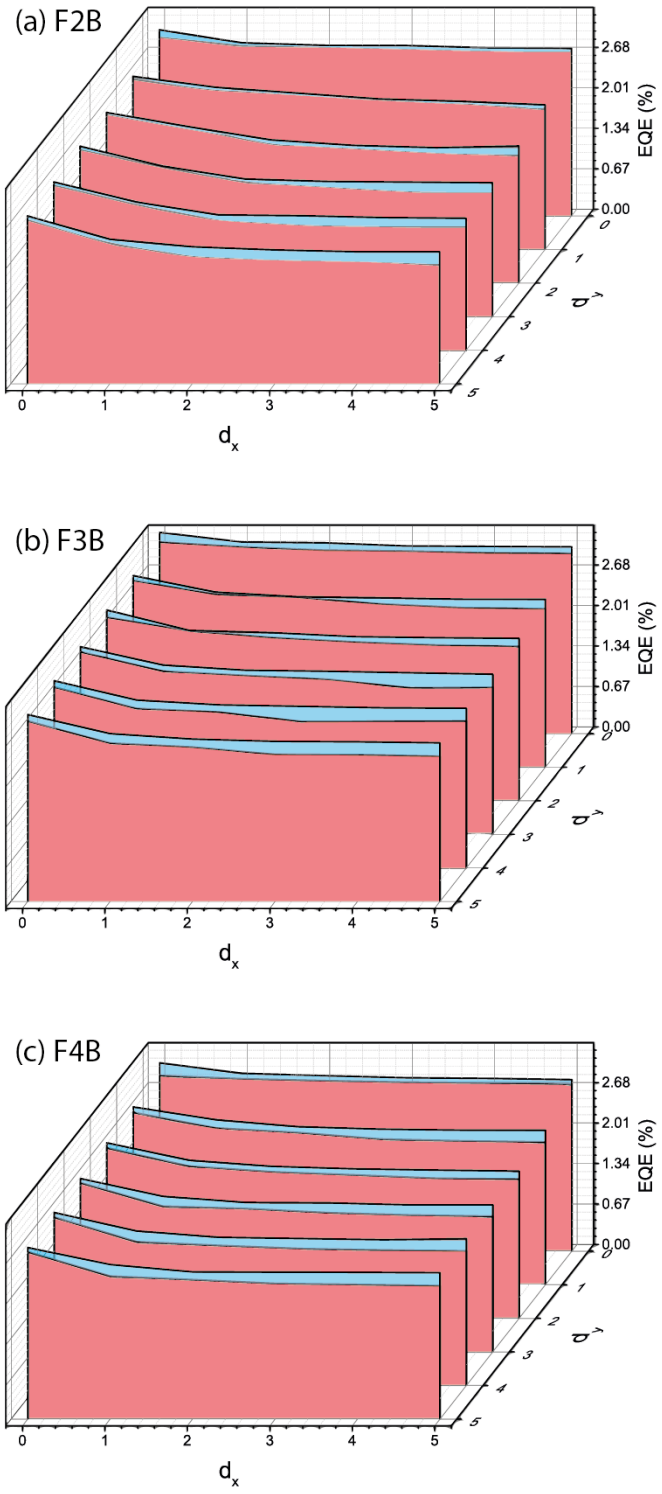
Supplementary Information



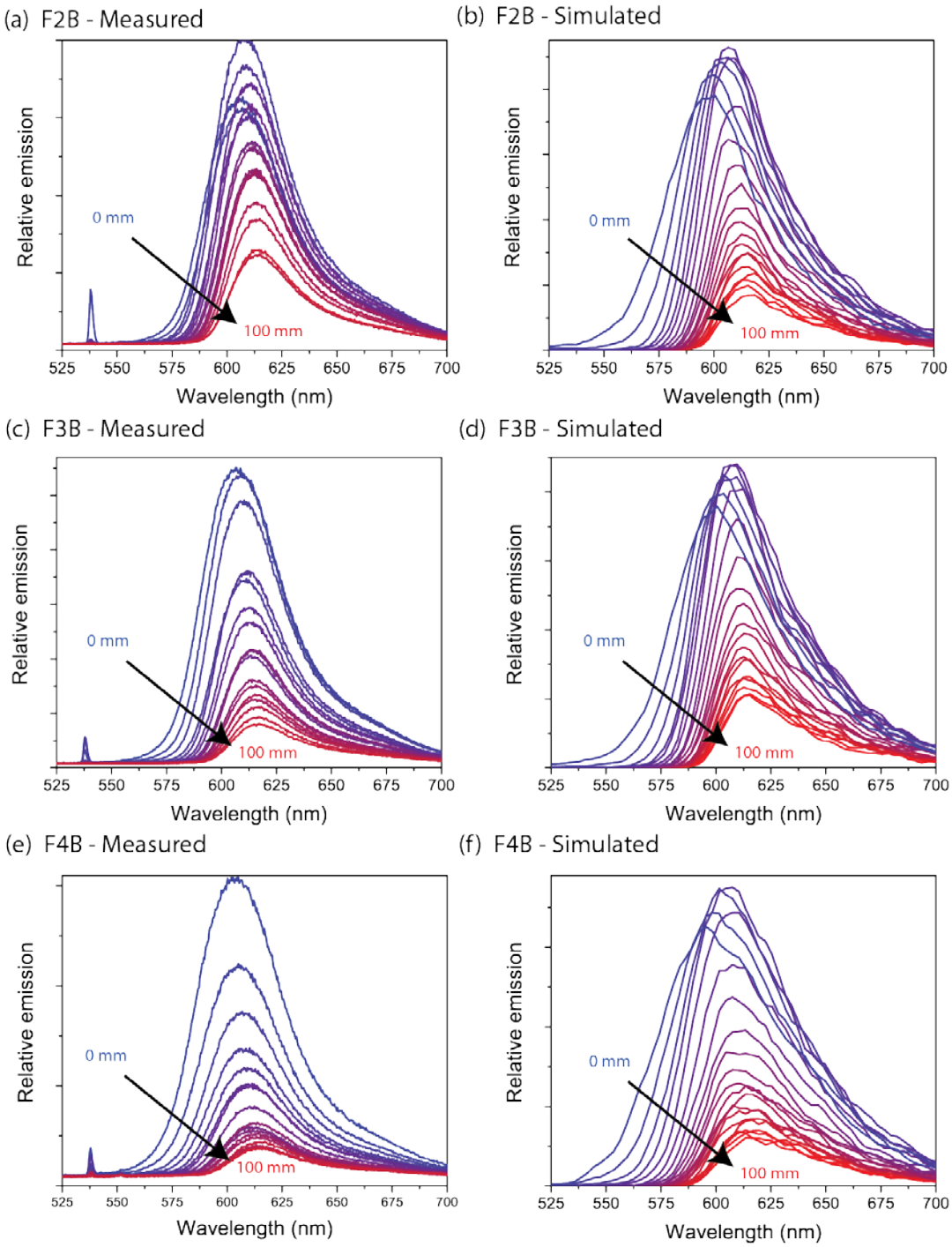
Supplementary Figure 1: Normalized absorbance and emission of the oligofluorene molecules in toluene.



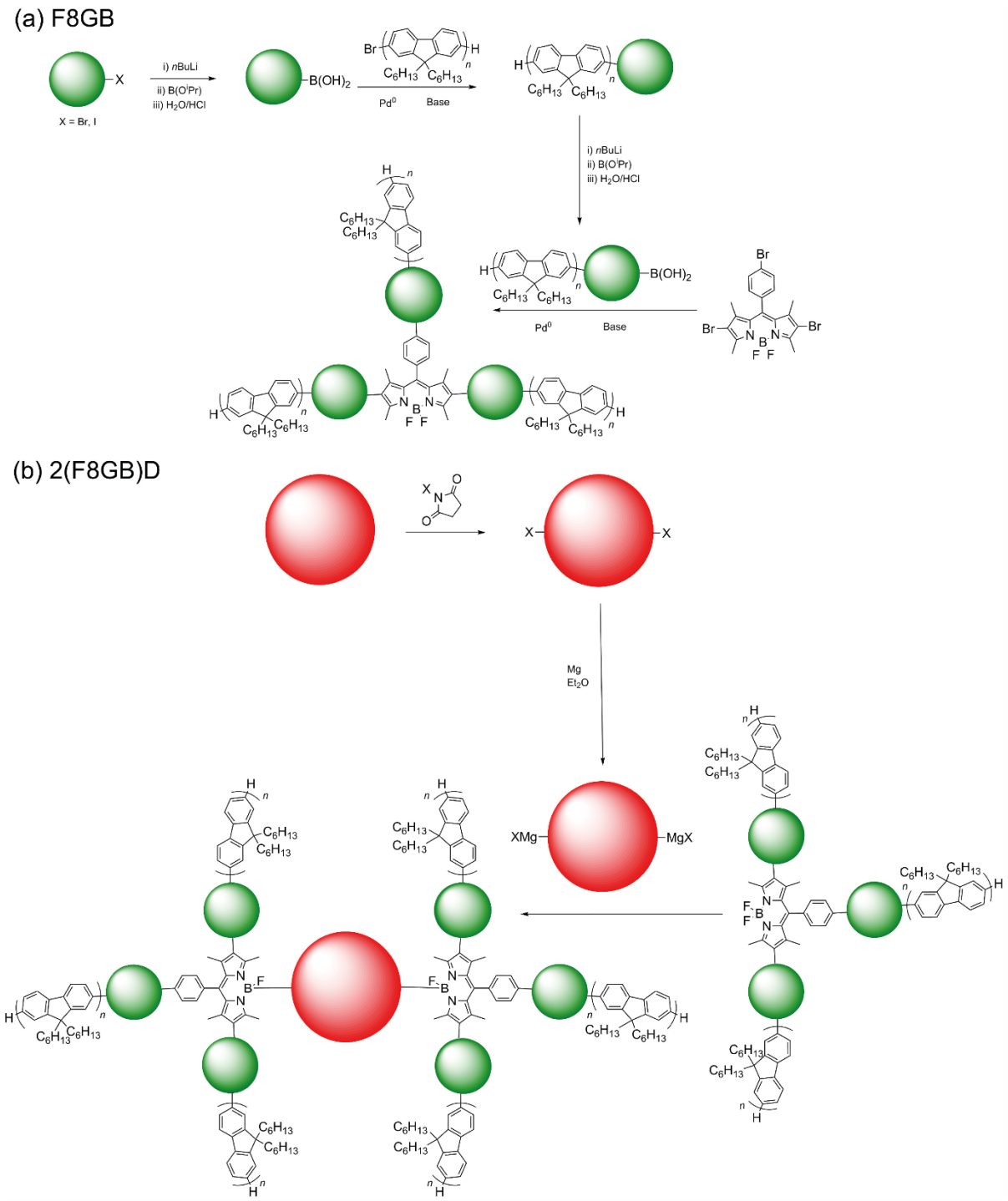
Supplementary Figure 2: Images of the LSC devices fabricated and the devices under 523 nm excitation. Bright spot in the centre of the bottom image is the excitation spot.



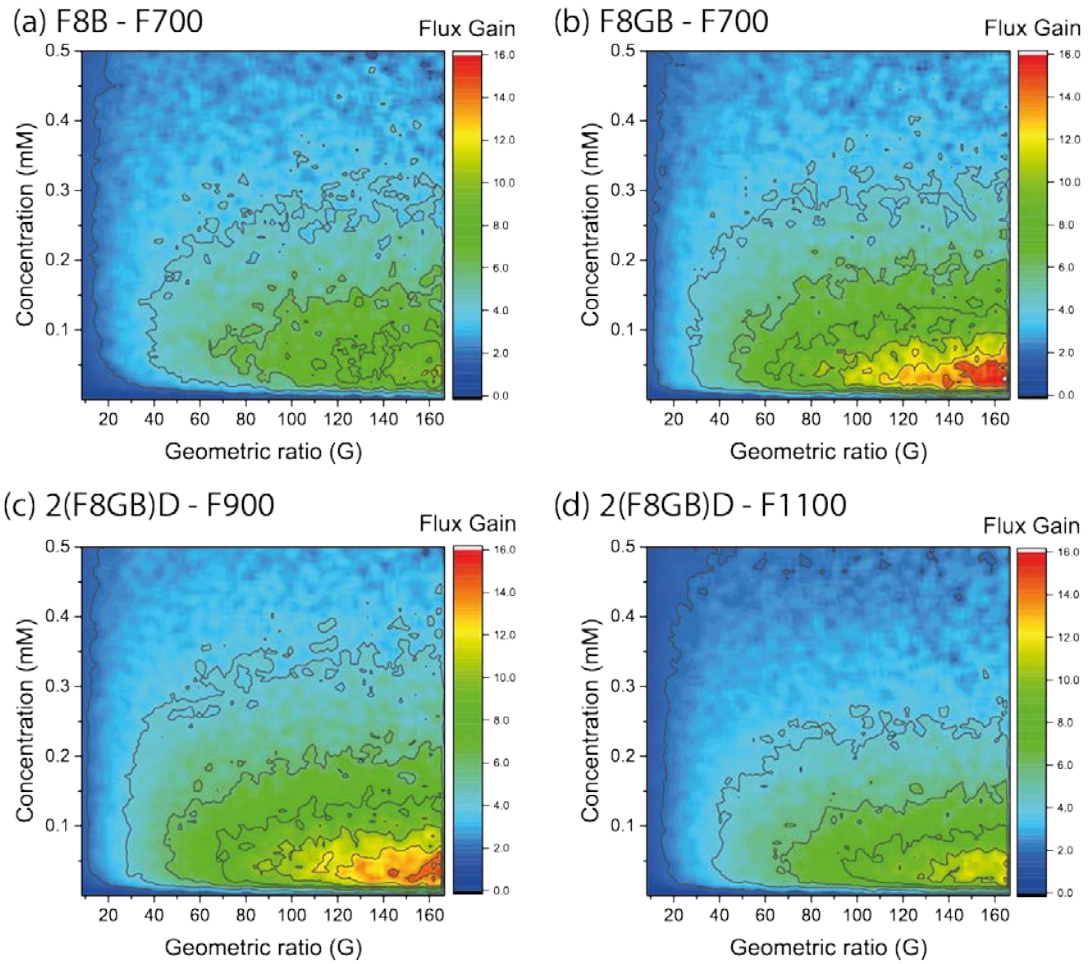
Supplementary Figure 3: Comparison between measured (red) and simulated (blue) EQE for x,y coordinates. (a) F2B, (b) F3B and (c) F4B.



Supplementary Figure 4: (a) (c) and (e) spectral changes in LSC edge emission with excitation distance for all LSC devices. The peak at 532 nm is an artefact from the excitation spot. (b) (d) and (f) simulated spectral change in edge emission with excitation distance for all LSC devices. Data represent histograms collected from 10^6 incident photons. In 100 mm of propagation, the peak of the emission shifts by 9.6 nm, 10.5 nm and 10.2 nm for F2B, F3B and F4B respectively.



Supplementary Figure 5 : Proposed synthetic scheme for (a) F8GB and (b) 2(F8GB)D. Examples of units with chromophores suitable for use in place of the spherical placeholders include: dithienylbenzothiadiazole units with peripheral carbazole moieties[1] or star shaped diketopyrrolopyrrole centered oligofluorenes[2] (red sphere) and 2,1,3-benzothiadiazole units[3] (green spheres)



Supplementary Figure 6 : Results of Monte-Carlo ray tracing simulations on hypothetical OFBM molecules, with PLQEs of 0.80. Flux gain with changing concentration and devices size for (a) F8B, (b) F8GB and ((c) and (d)) 2(F8GB)D.

References:

(1) Wang, Z.; Lu, P.; Xue, S.; Gu, C.; Lv, Y.; Zhu, Q.; Wang, H.; Ma, Y. *Dye. Pigment.* **2011**, *91*, 356–363.

(2) Kanibolotsky, A. L.; Vilela, F.; Forgie, J. C.; Elmasly, S. E. T.; Skabara, P. J.; Zhang, K.; Tieke, B.; McGurk, J.; Belton, C. R.; Stavrinou, P. N.; Bradley, D. D. C. *Adv. Mater.* **2011**, *23*, 2093–2097.

(3) Belton, C. R.; Kanibolotsky, A. L.; Kirkpatrick, J.; Orofi, C.; Elmasly, S. E. T.; Stavrinou, P. N.; Skabara, P. J.; Bradley, D. D. C. *Adv. Funct. Mater.* **2013**, *23*, 2792–2804.